NATURE MAGAZINE

OCTOBER 1933 35¢ VOL. 22, NO. 4

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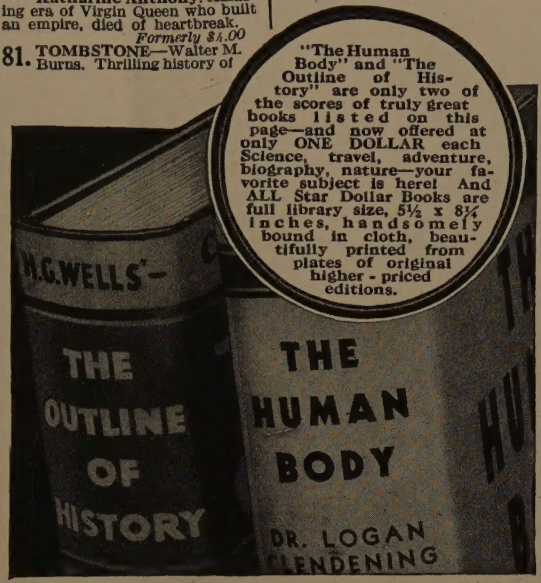

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ENTER, THE MINIATURE CAMERA

By AUGUSTUS WOLFMAN

The trend in the advancement of photography is constantly towards a smaller size negative with the consequent reduction in the size of the camera. When photography was in its infancy 5 by 7 inch, and 8 by 10 inch negatives were the usual sizes with which the amateur had to contend. The apparatus to accommodate such size negatives was necessarily large and bulky, limiting the activities of the photographer. As lenses, sensitive materials, etc., improved smaller negatives such as 2¼ by 3¼, 2¼ by 4½ inch and 3¼ by 4¼ inch came into vogue. Now we have what seems to be the utmost in the advance of camera manufacture—the miniature camera. Naturally such instruments were made possible by the progress and improvement in the manufacture of the materials used in photography.

Modern miniature photography was started eight years ago with the introduction of the Leica camera. An idea of the progress made in this type of photography can be had from the fact that to-day the mentioned camera is recognized as a high precision instrument, and is perhaps the most versatile camera made. It can accommodate more than 200 accessories which adapt it to various fields of photography.

Miniature cameras are classified into two types; those that use regular vest pocket size roll-film, and those that accommodate standard 35 mm. motion picture film. The former type takes 16 pictures on a roll of vest pocket film. The motion picture film type accommodates sufficient film to take up to 36 exposures with one loading—quite a boon when many picture possibilities appear at once. The cameras using roll film produce negatives measuring approximately 1¼ by 1⅝ inches. In the motion picture film class there are two sizes, single frame and double frame. In the former type the negative size is that of a single frame of motion picture film, ¾ by 1 inch. The double frame size measures 1 by 1½ inches.

Naturally contact prints of such small negatives are out of the question for practical use. Enlarging must be resorted to. Here is where the veteran photographer would speak up, "But what about the loss of sharpness and the appearance of grain when such small negatives are enlarged?"

Perhaps the meaning of "grain" should be explained. The images on the negative consist of varying deposits of metallic silver held together by gelatin. The individual grains of silver which go to make up the negative image clump together, and these clumps further aggregate to form larger clumps. This is visible only under a microscope. However, when a tiny negative is enlarged to a 5 by 7 or 8 by 10 or larger size these aggregates of clumps will be sufficiently enlarged to give the print a grainy appearance.

Graininess in the negative is overcome in two ways. The first is the use of a fine-grain film. In roll-film such types as the Eastman Verichrome, Agfa Plenachrome, Gevaert Express, Perutz, and the new Agfa fine-grain Plenachrome are representative of the fine-grain variety. Motion picture film must of necessity be of the fine grain variety. In regular use it is flashed in a tremendously enlarged form upon the screens of theatres. If you ever get the opportunity to get close to a professional motion picture screen you will get a good exaggerated idea of what grain is. The images will appear like a bombardment of individual particles upon the screen.

THE PHOTOGRAPH ABOVE IS AN ENLARGEMENT FROM A MINIATURE CAMERA NEGATIVE AND SHOWS THE GREAT POSSIBILITIES

The second means of overcoming graininess is to develop the film in a fine-grain developer. Such developers contain a high concentration of sodium sulphite which has the property of dissolving away a part of the silver particles in the emulsion while the film is being developed resulting in a fine-grain negative when development is completed. With such a fine-grain negative it is possible to obtain large prints without grain appearing. All manufacturers have fine-grain developing formulas for their films which are at the disposal of the photographer. Such developers also come in a ready prepared form which just requires their solution in water to be ready for use. Examples of these developers are Rytol, Tancol, Hauff's Glycin, Perutz, etc.

Now as to the loss in sharpness when miniature negatives are enlarged. We must first of all realize that the smaller the size of the negative, the smaller is the focal length of the lens required to cover the area of the negative. As the focal length of a lens is reduced its depth of focus increases. The smaller lens produces sharp results because of the greater field it reproduces in sharp focus. A lens of two-inch focal length is the usual objective used on miniature cameras. To give you an idea of its great depth of focus, when used at a diaphragm opening of f:9 and focused at 20 feet everything from 8 feet to infinity will appear in sharp focus in the subsequently enlarged print.

Here is another important point to consider. Very highly corrected lenses are used on these cameras. These lenses represent the utmost in the correction of optical defects. The proof of the degree of perfection of these lenses is quite evident in the enlargements of miniature negatives.

To the Nature photographer the miniature camera presents an efficient and simplified means of procuring photographic records. We must first of all consider portability. This instrument is truly a pocket camera. Consider such sizes as 5¼ by 2¼ by 1¼ inches, and 1¼ by 2¼ by 2¾ inches and you will realize the compactness of the miniature camera. With a few accessories it occupies a case the size of the type used for field glasses.

Its compact size also enables it to be brought into use very quickly. It is not very convenient to carry along a large camera opened for use whenever necessary. The usual custom is to close the camera after it has been used until the next opportunity presents itself. The miniature camera can easily be held in one hand ready for action whenever a subject appears.

Another factor in its favor is the depth of the short focus lens that it uses. Errors in focusing will not be as obvious as when a lens of a long focal length is used. Due to the short focal length of the lens greater speeds are possible. The usual minimum speed of the two-inch lens used on these baby cameras is f:3.5. Many are provided with greater speeds such as f:2.7 and f:2.0. Such high lens speeds enable good pictures to be taken under adverse lighting conditions, and also allow faster exposures to "freeze" the action of animals.

Some miniature cameras such as the Foth Derby, Contax, and Leica, can accommodate lenses of various focal lengths. The interchanging of the lenses is a matter of a few seconds, the cameras being provided with either a bayonet or screw type lens mounting.

Naturally the adoption of miniature camera photography requires a slight change in the technique of the man who has been playing solely with large cameras. Everything is built on a smaller and more precision-like basis, and therefore the camera should be treated accordingly. The small size of the finder requires that it shall be held close to the eye in order that the exact field may be seen.

CHOOSING A SCHOOL

By Richard Deshon

Director, School Service
Nature Magazine

ACADEMIC STANDARDS

College Entrance Board requirements dictate the academic program of the preparatory schools. Some schools send most of their graduates to certain colleges, but when a parent decides what college his son or daughter is to prepare for, the preparatory school should be chosen with this in mind. The student will then receive the best preparation.

If your son or daughter is not going to college, you may be interested in a two-year Junior College or one of the vocational schools giving the best training in the fine and practical arts.

THE ATMOSPHERE

By visiting a school personally, as we suggested last month, you will learn much about the school and the work it is doing. Certain schools have long appealed to certain classes. When you consider a school it is well to inquire about its past patronage; then talk to some parent who has sent his son or daughter there.

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Despite the great depth of focus of the short focal lenses used pains should be taken to obtain accurate focus especially if the negative is subsequently to undergo great enlargement. Two of these cameras possess built-in range finders eliminating guesswork in focusing. Others can readily be provided with an attachable range finder.

Extreme care must be exercised in the development of miniature negatives and it is therefore advisable for the photographer to do this work himself rather than have it done by a photofinisher. Use only a fine-grain developer, which can be obtained in a ready prepared form or the formulas of such developers can be obtained upon application to the manufacturer of the film you are using. The developer and all the other solutions should be strained to eliminate all dirt particles which may mar the negative.

When subsequently enlarging the negatives it is best to use the type of enlarger which is especially built for miniature work. These enlargers emit parallel rays of light which minimize grain and any other defects which the negative may possess. Should the negative display excessive grain use a rough surfaced paper upon which to print it. This type of printing paper unlike the glossy and smooth papers has the ability of concealing the grain in the negative.

Miniature photography requires its adoption to prove to the skeptic that it is a practical and useful method of photography. Its followers are increasing daily. When we consider that they have been used by Dr. Lawrence M. Gould, 2nd in command of the Byrd Antarctic Expedition, Sir Hubert Wilkins on his Arctic Submarine Expedition, and Robt. MacMillan on his recent Labrador aerial survey work we realize that these instruments really possess all the superior qualities attributed to them. Miniature photography is not a fad which comes and goes, but represents a marked advance in the progress of photography. Its adoption will naturally require a slight change in the technique of the photographer, but it will also present to him greater fields of activity.

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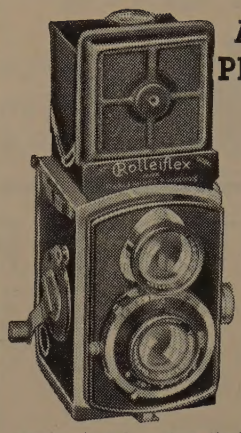

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BILLBOARD SLOGANS

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CONTEST REVEALS PUBLIC FEELING AGAINST HIGHWAY SIGNS

• • •

CONFRONTED by a deluge of 1362 different slogans expressing all degrees of dislike of highway signboards, the judges in the contest announced in the July issue of NATURE MAGAZINE had a difficult task in choosing the winners. This was further complicated by the fact that they were widely separated and could not confer personally about their selections. So lists of the slogans were sent to Herbert Johnson, the cartoonist, at his home near Philadelphia; to Struthers Burt, the novelist, at his Wyoming ranch, and to Arthur Newton Pack, president of the American Nature Association, at Juneau, Alaska, a port of call on his expedition this summer.

When the selections came back it was found that all three of the judges had given support to the slogan, "Billboards Destroy Motoring Joy." While this choice was not given first place by all three of the judges it was the only one placed among the first ten unanimously. So the first prize of twenty-five dollars goes to Margaret Ordway, Franklin, North Carolina, and the judges extend congratulations to her for devising an effective and comprehensive slogan.

Selection of the winner of second prize was perhaps even more difficult. However, using the system of weighing each slogan by the order in which it was selected on the judges' lists, it was found that two slogans were in an arithmetic tie for second place. The American Nature Association, therefore, decided to award two second prizes of ten dollars each instead of the one originally announced.

So to Agnes S. Love, Coulterville, California, goes one second prize for her slogan, "S.O.S.—Signboards Obstruct Scenery." And to Edwin L. Clarke, Winter Park, Florida, the other second prize for his slogan, "Billboards Offend Tourists Who Spend." Curiously enough Mr. Clarke almost duplicated the winning slogan with one which declared "Billboards Destroy Motorists' Joy." The judges, however, felt that "motoring" was more effective than "motorists." To Miss Love and Mr. Clarke the judges also extend their congratulations.

To the many others who gave time and thought to this contest, the American Nature Association and the National Council for Protection of Roadside Beauty wish to express their deep appreciation. In most contests entrants are inspired solely by the prizes offered. In this one the prizes were most modest and it was plain from the letters written with many of the slogans submitted that the inspiration was sincere and indignant opposition to the billboards along our rural highways.

One entrant sent her slogans in on the Fourth of July with the observation: "Not being capable of thinking of any more patriotic action for July Fourth, 1933, than in trying to frame a slogan for your contest, I herewith submit three." Another contestant declared, in submitting the excellent slogan, "Billboards Hide the Country's Pride," that he is "very much interested in the fight against billboards and considers them a menace to the motoring public." Another entrant pertinently observed: "As long as people continue to buy products so advertised billboards will go on, as the billboards on the air flourish to the detriment of any enjoyment by radio. If 'we the people' only could be brought to realize our power!"

Many similar observations were contained in letters from entrants who seemed to welcome the opportunity of thinking up a slogan as a means of getting "off their chests" indignation about scenery-marring and dangerous signboards.

It is customary in contests to give honorable mention. It may give contestants some satisfaction, and it at least gives people interested in the contest an opportunity to disagree with the judges. We will list, therefore, the following slogans with their authors since these slogans were ones placed on lists of the ten best by the judges.

"Safety First—Ban Billboards," by Gypsie Millord, Blountville, Tennessee; "I Buy No Billboard Articles," by Robert S. Gordon, New York City; "Signs Sacrifice Safety and Scenery," by Donna Hoogesteger, Grand Rapids, Michigan; "Safety First—Billboards Last," by Laura Stafford, Youngstown, Ohio; "Billboards Are Roadside Racketeers," by Thelma J. Smith, Grand Bay, Alabama; "Watch the Billboards and Crash," by O. V. Haight, New Brunswick, New Jersey; "Abolish Billboards—Safety and Sightliness," by Zelma O. Baker, Sterling, Colorado; "Signs Suit Cities—Not Highways," by J. L. Brown, Bristol, Tennessee; "Let's See Scenery, Not Signs," by Joseph Joffe, Yellowstone Park, Wyoming; "Billboards Distract—Invite Mishap," by Oliver Shipp, Newburgh, New York; "Give Us Scenes Not Signs," by Clara A. Staudenmayer, Jamaica Plains, Massachusetts; "Be Highhat—Snub the Billboards," by Naomi M. G. Ekdahl, Durham, New Hampshire; "Danger! Billboards Ahead!" by J. L. Brown, Bristol, Tennessee; "De-sign Our Roads," by Isadore Melazar, Philadelphia, Pennsylvania.

"OLD, HE WAS, AND WISE WITH
THE SHARPNESS OF THE FOX AND
THE DARK WISDOM OF THE WOLF"

NATURE MAGAZINE

VOLUME 22 OCTOBER · 1933 NUMBER 4

THE HUNT OF THE COYOTE

BY LORENE SQUIRE

PHOTOGRAPHS BY THE AUTHOR

THE COYOTE'S slender paws made sharp footprints in the sand. He trotted past plum thickets and gnarled willow trees, yellow drying cactus and dead stalks of the sotol flower. His family responsibilities were ended. The month was October and there was about the sly, wolfish creature an air of holiday. While he leisurely loped over the sandhills he seemed to be grinning to himself. In this brief, gracious weather before the lean hardships of winter he was taking his ease, following the circuitous course of the river beneath a drowsy autumn sky, unmindful for the moment of danger or his next meal.

A marsh hawk, his eyes alert in the hazy autumn sunlight, idly flapped above the coyote's head in the hope of any rodents the little wolf might scare up. Farther above there hung, on wide pinions, a bald eagle, come down from the Rocky Mountains to sail over the autumn plain. The coyote cast a suspicious glance at the bird circling and screaming against the amber sun. He had an unpleasant memory of a day when an eagle had plunged down and struck him on the flanks, paralyzing him for the moment, then dazing him by another attack on his head. There had been a confused, terrifying battle against tearing beak and claws and pounding wings until the coyote's mate appeared and the eagle had beat a retreat aloft still screaming his challenge. There were faint scars upon the little wolf's sharp, black-marked head telling of this struggle. But the circling eagle seemed drowsing on the wing.

Old as he was, and wise with the sharpness of the fox and the dark wisdom of the wolf, the coyote, this afternoon, seemed but a happy and carefree little dog intent upon absurd adventures. There was a whimsical cock to his head and his yellow eyes were happy and bright. Now and then he pounced with his paws upon a clattering grasshopper and then ate it. But that was as far as his hunting took him. Indeed, in the gracious peace and goodliness of the autumn scene, he even forgot for the moment his fear of man. He forgot traps and guns, wolf hounds and poison bait. This was not an afternoon to hunt nor to be hunted. In the sandhills all was still except for the whir of cicadas in the tall cottonwoods by the river and the distant voice of a crow.

Then, as the coyote paused to roll upon a black and yellow land turtle, a faint, far away sound sent him suddenly to his feet, every sense alert, a lean, shifting cunning suddenly clothing his taut form. He dropped down behind a clump of spike weed. His yellow eyes burned to two points of sharp light as he looked back over the drowsy sandhills. The shadow of a flock of south-flying ducks skimmed across him. The marsh hawk flapped and veered drowsily away. Raising his sharp head the coyote sniffed the air, but whatever breeze there was floated after him instead of toward him. He could see or scent nothing, but to his ears a sound gathered in volume. It was a cry such as he had often heard farm dogs make when yelping after a rabbit but this was deeper throated and many times multiplied. This was a pack of dogs hunting together. Then a crow's resentful call from a clump of cottonwoods at a bend in the river told the coyote that man was in the offing. A sudden veering of the wind brought him the scent of men and dogs and horses. Men on horseback were after him again, he now knew, but with a different kind of dog. In these same sandhills and in the prairie round about he had often had to run for his life from stag hounds and wolf hounds—dogs who had sped after him silently and more swiftly than he could ever run but who had

"THE COYOTE, THIS AFTERNOON, SEEMED BUT A CAREFREE AND HAPPY LITTLE DOG INTENT UPON ABSURD ADVENTURES"

often run almost over him in hiding, never smelling him out. But these dogs were not the same. They raised a great bloodthirsty cry as they ran. The coyote felt the hunted creature's awed, startled helplessness at the confident din of the baying hounds. He danced first on one foot and then on another unable to make up his mind what to do. Then he glimpsed the pack surging across the sandhill on the trail of his shifting, wayward feet. He had never seen such purposeful dogs. He wheeled and sprang away. The hunt of the prairie wolf, who was as much fox as wolf, was on.

The little coyote became a streak of yellow brown skimming across the yellow dunes. A troop of crows in a dead willow cawed in what might have been admiration. A badger, dozing in the sunlight at the mouth of his burrow, opened shoe button eyes, snorted and scrambled into his den. The coyote ran until the sound of the pack's baying dwindled into nothingness, and then he ran until his swift heels could take him no further. He came to rest in a clump of willows overgrown with wild grape vine near the river bank.

The wolf sank back on his haunches, his red tongue lolling, gasping for breath but with a sly triumphant look in his yellow eyes. These hounds could never catch up with him now. Never in all his experiences with wolf hounds and stag hounds had he put distance between himself and his pursuers with such little effort. He lay flat on his belly upon the cool sand beneath the over-hanging tangle of autumn grape vine. A catbird crooned a small, drowsy tune above his head and a tattered-winged, black and yellow butterfly fluttered about in the yellowed grape vine tendrils over him. A small mouse peered from her hole and darted back again. The coyote grinned, feeling himself a very clever fellow; proud of his swift flight.

Suddenly he sat upright, and very still. He heard the hounds again. They were coming nearer in full cry, no whit less confident and purposeful than before. The hairs raised along the back of the little wolf's neck. He hated these traitors of his own race who would rend him to pieces if they caught him because to do so was man's wish. He wanted to wait and tear into these hounds, working out the energy of his hate against them but eleven years of prairie life had taught him much. So again the prairie wolf fled.

A coyote can run thirty miles an hour. Beset he can make thirty-five. In spite of his weariness he drove on at this speed. The creatures along the way felt his terror and ran at right angles away from him. Over the sandhills and into the open prairie he sped—his breath coming in labored gasps, his head down, his legs moving in a loose-jointed, shambling gait. Fashioned though he was of steel and leather, tempered and tightened by Kansas sun and wind, he was beginning to fail. In the hysteria of his fear he now and then turned back to see if the hounds were yet following him. He bounded through a

"A FAINT, FAR AWAY SOUND SENT HIM SUDDENLY TO HIS FEET . . . A LEAN, SHIFTING CUNNING CLOTHING HIS TAUT FORM"

herd of cattle and on across the sprouting wheat field while gently amazed cows stared moodily after him. Then down he dashed into a corn field where he leaped almost into the arms of a farmer shocking corn. The farmer yelled "Hi!" and wished for his gun. But the little wolf struggled on although every bound called upon a will strong with fear. He who had laughed at wolf hounds, steel traps, wolf round-ups, irate farmers and watchful hunters was now in panic from the simple baying of a pack of fox hounds. His feet were heavy. He stumbled often. His heart labored torturedly. In a gasp he thought of an old badger den upon the edge of a freshly-planted wheat field. With slow, aching strides he dragged himself into it and lay in the shallow caved-in burrow sobbing for breath, his eyes glazed, his old body quivering. The hounds would find him here but he did not care. He would never run again, but it did not matter.

There came to him the dim sound of men's shouts and the puzzled calls of the dogs now among the herd of cattle. His trail there gave them pause for a moment. The exhausted coyote in the badger hole sensed now what he should have done to evade these heavy voiced, determined dogs. He knew now that if ever he had the chance of flight again he would mix the scent of his feet with other smells. But the lesson came late. The hounds were almost upon him, and he did not have the heart left for another burst of speed.

Wily and old he crouched in the burrow knowing that the end was upon him—he who had always lain low and looked and smelled and listened before he met a new issue. He turned in his burrow and dug feebly back through the loose sand and clay. The dogs came closer. He wanted to think that he would be safe here as he had been in dens before when he had hid thus away from wolf hounds and stag hounds. But he knew that the hounds would smell him out; that the shallow burrow would not halt their wild urge to hunt him down. To remain here meant death but he wanted only to lie here in the dark quiet and let it come.

The hounds were half across the wheat field. Their victorious cries came to him. A dark stubbornness flooded his being. Tenaciously a coyote clings to his lean and persecuted life. By a magnificent effort of will the coyote forced himself to leap forth in open view of the hounds.

The fox hounds had never before seen a more bedraggled sorry looking quarry. The coyote's head was down; his tongue hung loosely from his mouth; his tail was between his legs. The hounds voiced their triumph; then seemed astonished when the wolf managed to evade the bounds of the closing pack. With a final surge of hope the coyote sought to keep just out of reach of the hounds; to tire them or discourage them. But in his own heart he knew that there was no hope for him. In his foes was that gameness of breed that would make them follow no matter how far he led them.

Suddenly he turned. He would not exhaust himself by

"THE LITTLE COYOTE BECAME A STREAK OF YELLOW-BROWN SKIMMING ACROSS THE YELLOW DUNES"

further running. Since he could not flee from the hounds he would take this last smallest chance of fighting them and getting away.

For a moment's time he sank down on his haunches and surveyed the blustering hounds and the men riding after them. His yellow eyes glared green. The coyote was not a valiant little beast in that moment, nor, yet, was he a tragic figure facing hopeless odds. In his eyes there gleamed a demon's laughter. He grinned.

The pack was upon him. The men on horseback saw a scramble of yelling, bleeding hounds and now and then one bloody, shaggy demon—green-eyed, slashing here and there. Then they could no longer see him. They parted the dogs; there lay a mangled piece of yellow fur—and two dead fox hounds. The remainder of the pack was sadly slashed and torn.

"I'm glad to see that sneakin', dirty, worthless, four-flushin' cayute killed," said a huntsman on a heavy western saddle. "I didn't think them hounds could do it."

The owner of the hounds looked quizzically at these native huntsmen. Then he surveyed his torn and depleted pack. He picked up the thirty pound carcass of coyote.

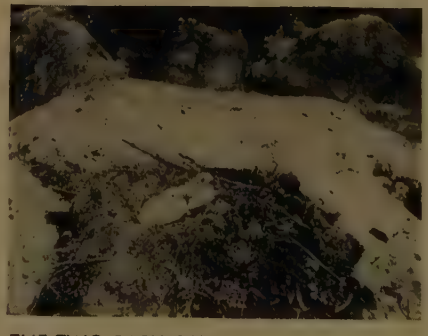
"So this is what you call the cowardly coyote?" he said. To everybody's puzzlement he said it with profound respect, for he knew that in that limp little wolf had lain the courage that could face fearful odds.

• • •

MYSTERY OF THE HERRING GULLS

BY ARTHUR JANES

EARLY in June, when camping with a friend on Fish Lake in northern Maine, I noticed a pair of herring gulls nesting on a small rocky island. I obtained a picture of the nest showing two mottled eggs, and later was fortunate to get another picture showing the young gulls in their nest.



THE TWO BABY GULLS
On their nest but unaware that tragedy was abroad

Several days later, I observed a number of gulls flying about the island crying and moaning, and knew something was wrong. We visited the island and found the young gulls out of their nest, both dead. Examination disclosed no sign of violence.

I could not fathom the mystery, nor could I imagine how the parent gulls (the only pair on the lake) had carried their message of distress to other gulls nesting on other lakes, three to five miles away. Did they fly to each lake and convey the news? Or did they fly high in the air beyond the vision of man and send forth a note which carried to the distant gulls? In any case, to us it seemed as though the others had come to condole with the lone pair.

The next morning all had left but the original pair, and on the second day they, too, departed from the lake.

A HANDSOME SPECIMEN OF THE ORIENTAL MANTIS SHOWING ACTUAL SIZE

This fellow dropped upon the window sill in the August sunlight for his photograph. He was brilliant green with distinct markings of purplish-brown on the wings and down the sides of the abdomen

THE PRAYING MANTIS

NOT AS RELIGIOUS AS HIS NAME, BUT A FRIEND OF THE GARDENER

BY WALTER F. SHENTON

PHOTOGRAPHS BY THE AUTHOR

"DADDY, Old Lady One-Arm has just caught a grasshopper, and you ought to see what a time she is having with it!" Greetings like this were common about our home last summer because all of us were much interested in the praying mantids which summered with us and made our bed of marigolds a living laboratory. "Old Lady One-Arm" was the pet name coined for one of them who had lost one forearm in some way or other, and who could therefore be rather surely identified.

Perhaps the scientific way to start this story would be to ask you whether you know the praying mantis when you see it. If you do not, the life-sized portrait of a full-grown adult as he alighted on the garage window in the full sunlight will give you a fair idea of the shape of this insect of insects. He has a triangular head with large eyes which will follow every motion you make, even if he has to turn his head and look over his shoulder, a trick to which he has exclusive rights among the insects. His forelegs are strong and athletic and when he is not looking for food he folds them up very compactly and stands high on the four hind legs, in an attitude so pious that the superstitious Orientals held him in reverence and called the attitude "prayer," whence the name *Mantis religiosa.* His thorax is rather long and slender and somewhat shield-shaped. The wings in the mature insect are long enough to cover the entire abdomen, but seem to be somewhat shorter in the females than in the males. The coloring runs through a rather mixed order of browns and greens. Some of the specimens we have examined here in Washington have been brilliant green, sharply marked with brown; others have been mottled brown over the entire body; and one which stayed for about three

The praying mantis is introduced on the cover of this issue and here is more of the story of this interesting insect. The author, Dr. Shenton, is Professor of Mathematics at American University, but his lifelong diversion has been the study of the habits of insects and flowers.

A WARNING TO INSECTS TO BEWARE

This fellow's wings are just beginning to sprout and he is all set up about it and ready to eat

weeks on the crêpe myrtle was green and pink and blended so well with the blossoms and leaves that she was hard to locate even when we knew just where to look for her. Even most careful photography with color filter and panchromatic film leaves some doubt as to where the mantis ends and the plant begins.

We should note at the outset that this appearance of religion would be rated as hypocrisy in human beings. The mantis stands with his four hind legs braced on whatever firm support he can find on his home plant, with his head erect and watchful and with his forelegs clasped as in prayer just above a flower head, or some other place where an unsuspecting victim is likely to land. A butterfly or a bee alights on the flower—out shoot the two forelegs like whips, and, almost too quickly for the eye to follow, the insect is closed in the spines of these strong arms as in an unfailing steel trap, and the head plunges greedily into the soft flesh of the victim, the mandibles cut open a gaping hole, and the feast is on. No amount of effort on the part of the victim seems to matter, the feast continues until the body is severed and part remains in each arm. At this stage of the repast the mantis begins to take an interest in what is going on about him, he takes a leisurely bite of food, then calmly looks around something in Jack Horner fashion, as if to say "What a smart boy am I!" His appetite is immense, but he does not kill just for sport. He eats every tiny particle of his quarry except the horny parts before stalking again. After finishing a meal, he customarily cleans up all the tiny spines on his arms, especially the two sharp, pointed ones at the very end. Then he sets out for prey again. A bee lands on a blossom four or five inches away from him; his quickly turned head shows us that he has seen it and is interested, then he begins a sort of swaying motion something like the slightest breeze constantly gives to tiny stems and leaflets of a plant, gradually working his way to the bee, a single step at a time, and the killing is on again. I have watched him eat a varied menu, from meal worms (he is a sight with a large meal worm caught in his arms and attacked as a real Southern Negro would bury his face in a wedge of watermelon!), through skippers, moths, butterflies, leaf hoppers, bumble bees, flies, beetles, grasshoppers, and crickets—the food must have one essential characteristic, it must move. In few cases have I ever seen him lose his prey once it was clasped in his arms. We have been able to get the baby mantids to eat aphids on occasion, but do not believe that they would make a steady diet of these in the open. Such a varied diet explains why every gardener should treasure this insect among his plants.

BABY MANTIS ONLY A FEW HOURS OLD

Ready to go out and hunt food. This gives an idea of the size of the young and how they resemble their parents

Many bits of folk lore have had their origin in the peculiar habits of the mantis. His large body, comical head, dignified motion, and praying arms have exacted a large amount of reverence from the ignorant peasants of his native Orient. It is claimed by the French farmers that he is a soothsayer (his generic name *mantis* is the Greek word for prophet) and that if asked for travel advice, he will invariably point out the proper direction to be taken. Other common names are Devil's Rear Horse, Nun, Saint, Preacher, Suppliant, while in our own South he is called a Mule Killer. Many authors state that they are worshipped by the Hottentots to such an extent that if one of them should alight on a person, this person is considered to be favored by heaven, and from that moment takes the rank of a saint.

There are two varieties of mantis common in the

region about Washington—the larger one, which often attains a length of three and a half or four inches, is called *paratenodera sinensis* and was first introduced into this country in the neighborhood of Philadelphia. This is the showier of the varieties, being brilliant green with sharp markings of brown on the wings. The commoner species, called *stagmomantis carolina,* has a plumper body and is more active than its larger relative. It is found as far north as southern New Jersey and is roughly three inches in length.

COPY OF AN ENGRAVING DONE IN 1781
Originally reproduced in color in a text by Barbut, but the engraver admits he had never seen a mantis

The mantids may have been in your garden for many years aiding you in solving your insect-pest problem, but entirely without your knowledge. They do not move about much, a fact that was shown rather distinctly in the case of Old Lady One-Arm who lived under careful observation for at least three weeks on a single large marigold plant. They hide in the ivy on the walls when the blossoms attract the insects, and on any other plant which has regular insect visitors. Their peculiar slow motion usually betrays their presence to you after you have become more or less expert in looking for them. Occasionally a fine specimen will appear in the open, unheralded and from parts unknown.

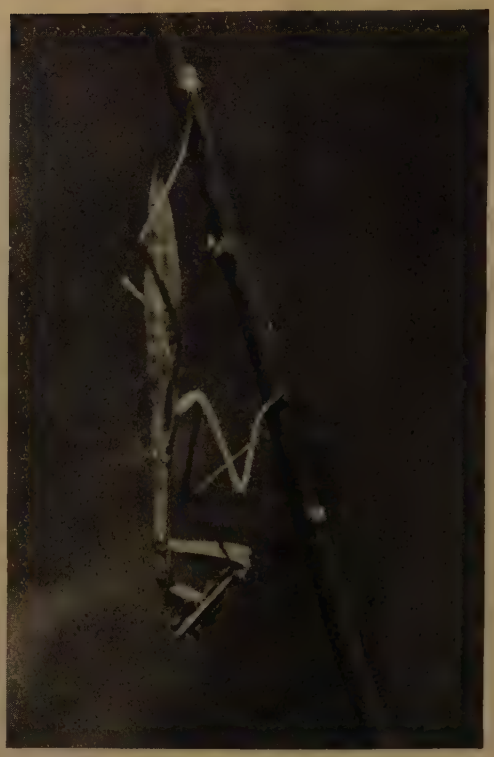
THE EGG CASE ON A BARBERRY BUSH
This shows the characteristic shape and texture. There were nearly 200 eggs in this case

Each year the editors of Nature Magazine have many inquiries concerning this seemingly dangerous insect. Inquirers need have no fear of the mantids for they are entirely harmless to man unless you pick them up by force, in which case you may receive an injury from their strong forearms which would be of the same sort as would be caused by small rose thorns. Indeed, the mantis has been a pet in some countries for many centuries. Their habit of duelling with each other has led the Chinese to carry them about in bamboo cages to fight with others in "cock fight" fashion. No insects submit to captivity more easily than the mantids, provided they are given a reasonable supply of living food. They very quickly become accustomed to the presence of their captors, will crawl quickly from their cage on to your hand or arm and will snatch living food from pinchers or a toothpick.

The comical way in which a mantis cocks his head to look at a person or insect is always amusing. My children insist that he appears almost human in his actions and *seems* to think. Surely certain specimens under our observation seemed to use brains. For instance, Old Lady One-Arm would invariably eat off the wings of a butterfly or moth before feeding on the body, so as to make it easier to hold. Other specimens reset the struggling prey from time to time to get a more advantageous hold.

Since last summer I have been able to make a first-hand study of the life history of the mantids. The eggs are laid in the early fall on any convenient rough surface:—a woody twig, a large stone, or even on the concrete of our dwellings, in a cornucopia-shaped mass of varying size. The material is grayish in color and tough in composition. The top is marked with transverse ridges, the eggs, about 150 to 200 in each case, are placed in layers or balconies and surrounded by a very tough case like dried foam, which protects them from the cold and from the weather. Late April and early May mark the hatching time. It happens something like this—a tiny grub-shaped body, creamy white, emerges from one of the balconies and drops on a short thread to a point below the case. As it hangs there it starts to wriggle and squirm, after a few minutes one pair of elbows begins to show, then another, and finally a third, then the head emerges and the tiny white insect crawls back on to the

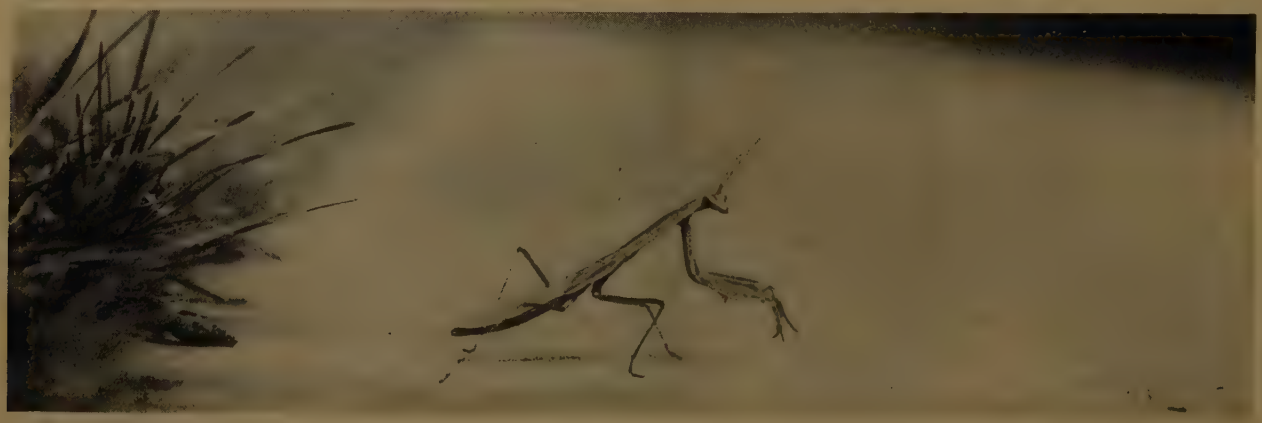
case or jumps off into the shrubbery to ripen, leaving a tiny shell hanging on the thread. After the case is emptied there is quite a tassel of these castings hanging to it. The new-born mantis has all the family features—pointed head, heavy forelegs, the "praying" attitude, the insatiable appetite—everything, except size and wings. His color changes in a short time to various shades of green or brown according to his species, or perhaps the color of his base plant. During the day he may be found flattened out on top of a leaf or stretched out on the stem of a plant, always on the alert for food, which seems to consist largely of small flies and leaf hoppers. In the early evening he crawls under a leaf to rest. As soon as his skin begins to pinch a bit he sheds the tight member and comes out larger and more brilliant in his coloring, leaving behind a castaway skin broken only on the back, showing every tiny part like a perfect glove. By the end of July he has attained about three-quarters of his size and the rudimentary wings appear. Just a few weeks more and the perfect insect, wings and all, makes its appearance. The females are always larger, have less elegant wings, but most prodigious appetites. The males fly about in search of their mates—many good authorities insist that the female devours the male after mating, but I have been unable to confirm this as a regular procedure.



A MANTIS AT DINNER

Below, a mantis, disturbed at his meal by the photographer, drops his meal and departs in the highest disgust

If you want to enjoy this insect at its best, be on the lookout for an egg case or two this winter. Do not bring them into the warm house as they will hatch out before you can find food for the infants. A rectangular aquarium with a screen top makes a fine home. As soon as the mantids reach any considerable size you will have to provide separate apartments for each one, as they are cannabalistic when hungry. Any live insects not too large for them to handle will make satisfactory food. My personal experience leads me to believe that this study will give you many hours of pleasure and much amusement.



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A glance forward to the November issue of Nature Magazine finds much of interest. A newcomer to our pages, Mari Sandoz, writes a fascinating story of a muskrat, a story of pioneer days. Hugh Sterling Davis, who is now with the Martin Johnsons in Africa, tells of the flying fish encountered crossing the South Atlantic. Ben East contributes a notable story of the grouse with pictures that are equally notable. Patten Beard, who will be remembered for her article on miniature gardens, gives us some amazingly interesting material on a tray landscape, an idea that is likely to start a new vogue. One of the most interesting stories we have read in a long time is that about the "miracle bacillus", a bacillus with a real history, told by Dr. Elliott R. Weyer. There are other features in November, too, and the more we look over the schedule for next month the better we like it. You will, too.

This is the second of two articles by Mr. Ware, Garden Editor of Nature Magazine, giving practical advice on planting at this time of year. The first article appeared in the September issue and both are worth saving.

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GARDENING: MID-SUMMER AND FALL

BY ROMAINE B. WARE

FALL, rather than spring, is the ideal time to make over the perennial garden or to start a new one. With the exception of varieties blooming at this season, almost all perennials may be transplanted in the fall. Practically all bulbs handle well now and every garden should include a wide variety. Narcissus, tulips, crocuses, scillas, snowdrops and others make the early garden a perennial joy. Numerous varieties of lilies are available for planting, especially since American growers are producing such fine stocks.

Below is a short list of perennials for fall planting. To become familiar with them, check over carefully in several catalogs. You may not find everything in all catalogs, although the better growers have large selections. Do not overlook catalogs as sources of garden information; every gardener should collect and preserve a goodly number. The more you become familiar with plant material, the better able you will be to select wisely for your garden. You will note that botanical names mainly are given below. This is because common names vary so much in different localities while Latin names are the same everywhere, or at least better established.

PHOTOGRAPH BY BOYCHUK

A CHARMING GARDEN GATEWAY IN OREGON

Such a feature of the garden offers opportunity for taste and ingenuity in planting about it and on the approaches to it

DWARF PERENNIALS (*One foot or less*)

Alyssum saxatile	Aster alpinus	Helianthemum
Anchusa myosotidiflora	Aubrietia	Myosotis
Arabis	Dianthus in variety	Sedum
Armeria	Erica	Viola

MEDIUM PERENNIALS (*One to two and a half feet*)

Aquilegia in variety	Coreopsis	Heuchera
Astilbe	Dicentra	Linum perenne
Campanula in variety	Doronicum	Primula
Centaurea montana	Funkia	Pyrethrum
Chrysanthemum maximum	Gaillardia	Veronica

TALL PERENNIALS (*Over two and a half feet*)

Althaea rosea	Helenium	Peony
Anchusa italica	Helianthus	Phlox
Delphinium	Hemerocallis	Platycodon
Digitalis	Iris	Scabiosa
Gypsophila	Lupinus	Valeriana

Among shrubs, a wide variety may be planted in the fall and thus be ready to start growth in the spring several weeks before planting could be undertaken. Unless dug and moved with liberal balls of soil it is wise to prune them back at least a third. A shrub or tree dug in the usual manner, with almost all soil removed, suffers destruction of a large portion of its feeding rootlets and until new growth replaces this loss the plant is seriously handicapped. Pruning back aids somewhat in reestablishing proper balance between root and top and makes it easier for the plant to resume growth.

The following list of shrubs is far from exhaustive as there are not only many others but each kind has numer-

A SMALL POOL AND TINY WATERFALL ADD MUCH

If the gardener can manage such a feature it will add to both the garden and his opportunity to achieve artistic results

ous varieties. Check them over in the catalogs and you will learn much about their habits and desirability. Although a wide variety is available, only a few gardeners seem to realize it because for the most part they use ordinary kinds. Plant according to habit of growth and spread at maturity.

DWARF SHRUBS (*Four feet or less in height—space two to four feet apart*)

Berberis thunbergi minor
Daphne mezereum
Deutzia gracilis
Hypericum aureum
Kerria japonica
Philadelphus hybrids
Spiraea anthony waterer
Spiraea thunbergi
Symphoricarpos albus

MEDIUM SHRUBS (*Four to ten feet—space four to six feet apart*)

Aronia arbutifolia
Cornus alba siberica
Forsythia suspensa fortunei
Lonicera morrowi
Philadelphus virginalis
Pyrus sargenti
Prunus triloba
Spiraea vanhouttei
Viburnum cassinoides

TALL SHRUBS (*Over ten feet—space six to eight feet apart*)

Cornus alternifolia
Hamamelis virginiana
Hibiscus syriacus
Rhus cotinus
Sambucus canadensis
Syringa in variety
Tamarix gallica
Viburnum dentatum
Viburnum trilobum

TREES IN THE GARDEN

With the advent of killing frosts and the consequent falling of leaves, deciduous trees may be safely transplanted. Trees play a most important rôle in our garden making, but great care must be used to choose the right varieties. Weeping willows are beautiful when they have room to develop, but they attain immense size at maturity. Planted in the wrong place they either crowd everything else out or have to be removed. Many other kinds grow as large, but numerous varieties are available which do not reach undesirable proportions.

Too, there are many trees which are valuable both for foliage and bloom. Dogwoods, magnolias, flowering cherries, crabs, plums and peaches are a few of these. The fall-flowering Franklin tree is exceptionally beautiful and now available at low prices. Do not overlook these choice novelties as you plan your garden. They are opportunities to add distinction and variety to the landscape.

It is possible to mention only a few of the desirable trees here but there are many others, as you will learn by looking into the subject. Get a copy of Hottes, *The Book of Trees* (It sells for $3.00 postpaid), and you will find they are fascinating as a hobby.

Trees, due to their relative permanence, demand the most careful selection and location. Where space is limited be sure to choose

MADONNA LILIES IN AN EFFECTIVE RÔLE IN THIS MINNESOTA GARDEN

Properly placed, these flowers give a note of distinction and dignity to the garden

PHOTOGRAPH BY COURTESY OF "HORTICULTURE"

ROCK GARDENS ARE THE RESULT OF CAREFUL PLANNING AND RESTRAINT

This one was built and designed by Ralph Hancock, and there was space enough for excellent variety. Even in small rock gardens there are great opportunities for beauty

the right variety to avoid crowding of other species.

DWARF TREES (*Up to twenty-five feet—ideal for large screen planting*)

Acer ginnala
Cercis canadensis
Chionanthus virginica
Cornus florida
Crataegus oxyacantha
Prunus subhirtella
Pyrus atrosanguinea
Pyrus parkmanni
Syringa japonica

MEDIUM TREES (*Twenty-five to sixty feet—better than the next group for the average yard*)

Aesculus hippocastanum
Ailanthus altissima
Betula alba pendula
Fagus sylvatica
Ginkgo biloba
Koelreuteria paniculata
Laburnum vulgare
Populus bolleana
Sorbus aucuparia

TALL TREES (*Over sixty feet—these demand large areas when full grown*)

Acer dasycarpum
Acer platanoides
Acer saccharum
Fagus grandiflora
Fraxinus americana
Platanus acerifolia
Quercus alba
Tilia americana
Ulmus americana

Fall planting of roses has long been urged by many growers. The last few weeks before final freeze-up is the proper time to plant, but soil should be prepared before this time. Most catalogs say roses will succeed without special soil preparation, but if you want the best results, see that the soil in which you plant is quite heavy. Clay loam is considered best. It should be rich in food elements, and barnyard manure is ideal. The location should be well drained and receive sun a good part of the day. Attention to these simple details will assure reasonable

HARDY BORDERS MUST BE CAREFULLY PLANNED

If continuous bloom is to be attained there should be nothing haphazard about the flowers planted there

success with roses and a fine display of these aristocrats.

Quality varieties are needed for the finest roses. Good roses are not costly today and every garden should enjoy some of the new varieties. New colors are available as well as varieties with disease resistant qualities. Climbers are now offered with recurrent blooming habit, a great improvement over older types. These bloom in June and more or less through the summer, as well as profusely again in the fall. The last few years have seen vast strides made in breeding new roses both in this country and abroad, and these should find their way into our gardens.

FURNISHINGS FOR THE GARDEN

Garden houses, sun dials, furniture and other features often make a garden livable

Sow Annual Seeds

One of the last of the season's planting tasks may well be the sowing of annual seeds. Experienced gardeners have followed the footsteps of Nature who sows her seeds late in the fall, thus discovering that plants from fall-sown seed get an earlier start and begin blooming ahead of those sown in the spring. Nature has been gardening longer than man so we can take the hint. The following kinds seem to take kindly to fall sowing, although almost any variety that self sows may be treated this way:

Alyssum, sweet	Cosmos	Nigella
Argemone	Eschscholtzia	Petunia
Balsam	Four-o'clock	Pinks, China
Calendula	Gaillardia	Poppies
Calliopsis	Kochia	Portulaca
Cleome	Larkspur	Snapdragon
Cornflower	Morning Glory	Zinnia

Seeds should be planted sufficiently late so that they will not germinate this fall, otherwise the tiny plants will be likely to perish during the winter.

A large variety of perennials may be raised from seed sown late in the summer. For most kinds, a coldframe is best to allow control of shade and moisture. When the first true leaves are formed transplant so that they may have room to develop. Many will grow fast enough to be placed in permanent locations this fall, or they may be left in the frame till spring. There are hundreds of varieties of perennials that may be raised from seed at a mere fraction of the cost of buying plants.

During recent years the summers and falls have been excessively dry with the result that there has been much winter damage. Unless rainfall has been abundant during autumn the entire garden should be watered generously just before final freeze-up. It is not desirable that plants freeze up in a pool of water but the soil to a good depth should be thoroughly wet. Plants can die from lack of moisture during the winter just as readily as in the summer. The drying winds of winter and early spring are harmful, especially to evergreens, so do not neglect fall watering.

Again and again I have been requested to come to the aid of gardens in difficulty and found the principal reason for their mediocre growth was lack of moisture. A high grade sprinkler that will spread water evenly over a goodly area should be used regularly. Let it operate in one spot for several hours until the soil is saturated thoroughly to a depth of six or eight inches. Test the depth by digging down at the end of each hour. Do not depend upon natural rainfall. The summer shower, even though it seems quite heavy, does not do a great deal of good. Gardens need regular and generous waterings.

As the final days of outdoor work in the garden approach, do not neglect thoroughly to clean up and burn all foliage, branches and stems of plants that may have been afflicted by disease. Blights, rusts, scab or scale infections live over on leaves, branches and twigs. If you do not burn all affected parts they will become ready sources of re-infection next year.

One of the final tasks before the garden is ready for its long winter rest consists of covering less hardy things. Do not get the idea that they are covered to keep them warm. The real value of covering is to keep them cold. No protective material should be applied until the ground is frozen, then it should go on promptly. Winter covering is primarily to prevent alternate freezing and thawing, to keep things frozen until time for the spring awakening.

Salt hay is unquestionably the best thing for winter covering because it protects without packing down and cleans up easily in the spring. Evergreen boughs, cornstalks, straw and other materials have their advocates and are useful under various conditions. Peat moss is an excellent winter mulch, keeping out heat and cold, does not pack down and may either be worked into the soil or easily cleaned off in the spring. (Continued on page 191)

THE CASE AGAINST THE COWBIRD

BY ALVIN M. PETERSON

PHOTOGRAPHS BY THE AUTHOR

"BIRDS," writes Burroughs in *Wake-Robin*, "are the greatest enemies of birds, and it is with reference to this fact that many of the smaller species build."

One of the worst foes of birds, especially of the song sparrows, phoebes and warblers, is the cowbird, and Burroughs might well have had it in mind as he wrote. This lazy parasite makes no nest of its own, but lays its eggs in the nests of other birds, causing them to lose their own broods. I have been on the cowbird's trail for several seasons, and know the scenes of desolation and destruction left in its wake.

A COWBIRD AT THE BIRD BATH

A parasite bird it is, foisting its offspring on other birds and causing sad results

The cowbird receives its name from the fact that it is generally seen in pastures near the feet of grazing cattle, where it feeds on insects frightened from the grass. It is smaller than the robin but larger than the English sparrow. The male is black in color except on the head, neck and breast, which are a rich coffee-brown. The female is a grayish-brown streaked with shades of light brown.

Like several other members of the blackbird family, which, incidentally contains such virtuosos as the Baltimore oriole, the cowbird is a poor singer. Occasionally it is to be seen perched near the top of a tree going through some rather ludicrous performances, and uttering notes that sound like "klo-kleece". Some of my friends say they sound like "po-lice", but the birds imposed on, not the cowbird, should sound this call.

The great damage done by the cowbird is due to the fact that each female lays four or more eggs in a season, usually in the nests of smaller birds. These as a rule hatch sooner than the eggs of the unwilling hosts, and the greedy, rapid-growing young visitors crowd the eggs or young birds of the owners to the ground beneath. There the eggs are lost and the young birds die from exposure or starvation.

On the fifth day of May some years ago, I found a phoebe's nest that contained one phoebe's egg and one cowbird's egg. On the ninth of May, the nest had four phoebe's eggs and the alien egg. The cowbird's egg had hatched by the twentieth but the phoebe's eggs had not. On the twenty-seventh, the young cowbird was quite large and seemed to have but little too much room in the nest, and a small dead phoebe lay on the ground below, crowded out by the impostor. Two phoebe's eggs were missing entirely, while the fourth, unhatched, lay beneath the interloper. This last egg never hatched. Shortly afterwards, the young cowbird got safely away. Four phoebes were in this instance lost in order to bring one cowbird to maturity.

A song sparrow's nest, found about half a mile away, held three sparrow's eggs and two cowbird's eggs. Near it was another nest containing a yellow warbler's egg and two cowbird's eggs. Here was ample proof of the harm the cowbird does to our finest birds.

I found the nest of a lark sparrow, about the middle of July, with three cowbird's eggs and two sparrow's eggs in it. A few days after the eggs had hatched, the nest held one young sparrow and two of the other breed. In a stump a few rods away was a bluebird's nest that held three cowbird's eggs and a single bluebird's egg. Here were two nests but a few rods apart that contained six of the eggs of this despised bird.

One day, the next year, before the snow was off the ground, I noticed a discarded yellow warbler's nest that seemed to be unusually deep. It apparently was a two-story affair. When I carefully removed the top story, I found a cowbird's egg buried between it and the first story of the nest. It had evidently been hidden there by the warblers when they discovered that it was not their own. They had, in fact, outwitted the cowbird. I found a second warbler's nest about a mile from this that was a three-story affair in which two cowbird's eggs had been buried by the outraged owners. Instances are on record where four-story nests have been found.

One would never suspect the catbird of being tricked by a cowbird, but later the same spring I found an egg in one of its nests. Its greenish-blue eggs were vastly different from the spotted egg of the impostor, and it seemed

EVIDENCE ABOUT THE COWBIRD WHICH IS MORE THAN CIRCUMSTANTIAL

At the left is the nest of a meadowlark containing cowbird's eggs. In the center two eggs among those of the song sparrow and at the right another song sparrow's nest has been invaded

that the alert and quick-tempered home-owner should have quickly pitched it from the nest. A blue egg and a speckled one were also seen together in a veery's cradle, but the parents seemed none the wiser.

How far these impostors can carry their tricks is always a source of great irritation to me. One day I heard the sharp alarm notes of a pair of song sparrows. Then within a few seconds, a young cowbird started from the grass close by, and the sparrows flew to it and made over it as if it were the most precious thing in the world. They were still feeding it and guarding it, though it was larger than they. After hunting for some time for signs of young sparrows, I concluded that they must have been destroyed some time before.

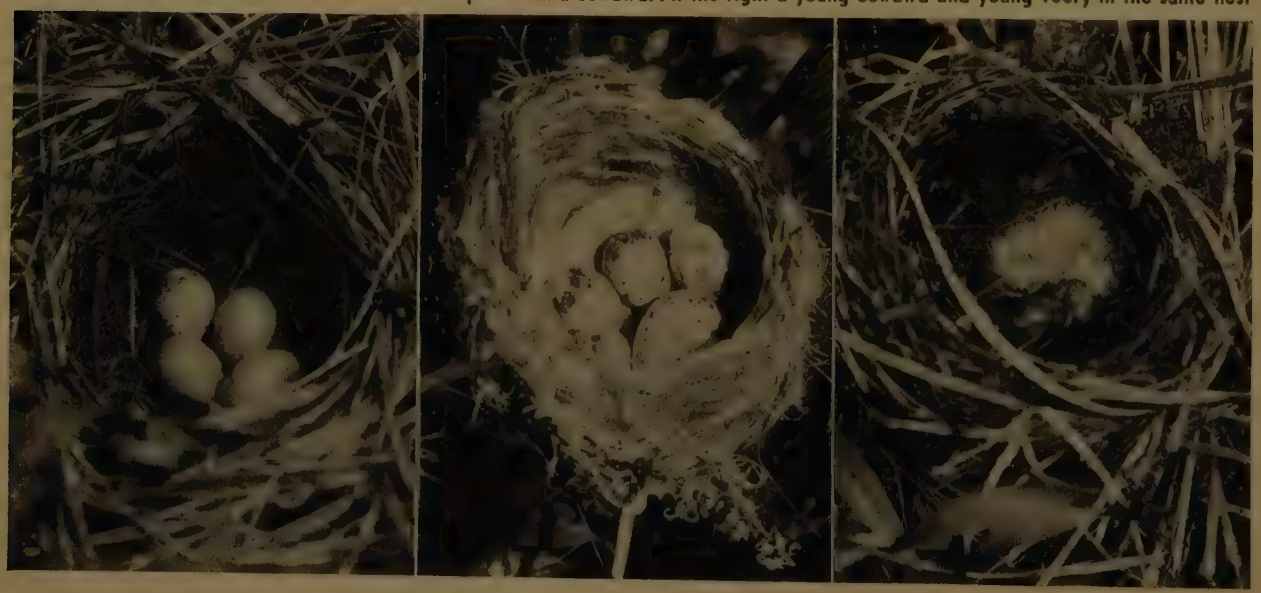
Cowbirds are especially active during the months of May, June and July. Females are often seen sneaking about trees and bushes and examining them for nests in which to deposit their unwanted young. I glimpsed one late in June that acted as though she had been caught in the very act of violating another bird's nest, and was a little ashamed of it. How she stretched her neck to watch my moves, and how hard she tried to keep behind the leaves and branches to avoid being seen!

I found the eggs of the cowbird, during the two years I spent on its trail, in the nests of the meadowlark, song sparrow, swamp sparrow, lark sparrow, phoebe, yellow warbler, bluebird, catbird and veery. I saw traces of its work on every hand; nearly every nest in some regions had one or more cowbird's eggs in it.

How many birds the cowbirds destroy is impossible to say. I counted several hundred usurpations during my casual studies. Gene Stratton Porter, in her *Homing with the Birds,* wrote of a flock of two hundred cowbirds that she observed near the banks of the Wabash River. These,

MORE RECORDS OF THE VISITS OF THE COWBIRD TO OTHER BIRDS' NESTS

At the left one cowbird egg lies with three of the catbird. In the center yellow warblers will have to compete with a cowbird. At the right a young cowbird and young veery in the same nest



she estimated, were responsible for the deaths of six hundred birds of beautiful plumage and exquisite song while breeding about four hundred more cowbirds to continue the depredation another season.

Fannie Hardy Eckstorm has written that "the cowbird is not only useless and morally disreputable, but she is actually criminal". Perhaps criminal is not the right word, for doubtless the female, after despoiling another bird's nest, would disclaim all knowledge of wrongdoing, and explain that she was merely following an old family custom. Even so, her lack of malice aforethought is no reason to allow her to destroy America's finest birds.

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AN INSECT SERENADER

BY L. C. PELTIER

JUST as the summer twilight closes upon the rasping finale of the cicada chorus, we hear the first rhythmic notes from that virtuoso of the night, the snowy tree cricket. Although his throbbing note is easily the most familiar and characteristic sound of the summer night, few have troubled to trace the music to its source and to watch the amorous vibrato of the pale musician.

With the aid of a flashlight it is possible to locate the tree cricket among the lower branches of trees and tall herbage. If the light is not turned on too strongly at first, he will often continue his fiddling for several seconds until finally he senses that he is being watched and shyly puts his fiddle away and moves to the other side of the leaf or branch.

SNOWY TREE CRICKETS
At the left the male and in the center the female, with the nymph, showing partially developed wings, at the right

The chirp is produced by the male crickets only and is used to attract the attention of the females, who often will be found nearby apparently listening attentively to the serenade. The fore wings are raised vertically above the insect's back and by scraping them together a note is produced which in pitch is about the second f above middle c. The sound itself is best described as a continual repetition of the words, "treat-treat-treat". Of all insects, he alone appears to appreciate orchestration, for should one cricket start his chirping out of time with the other crickets in the vicinity he will immediately change his tempo until all are in unison in the orchestra.

A particularly interesting fact in regard to this insect is that it makes a very reliable thermometer. It has been found that the frequency of its chirps varies directly with the temperature. This can be readily tested by simply counting the number of chirps per minute and applying the result to Dolbear's mathematical formula. In numerous tests made by the author the average error amounted to less than one degree.

The eggs are laid in autumn in considerable numbers in the twigs of various plants such as raspberry, blackberry and grape. They hatch out the following summer into nymphs. These resemble the parent insects except for the lack of wings. After about the fourth molt the stubby wings may be seen to be developing.

In daylight tree crickets can be found by beating the lower branches of trees, thereby dislodging them. Their relatively weak flight carries them only a few feet and they can be easily captured and examined.

They are rather soft and fragile creatures, pale green or white in color with prominent eyes and a long inquisitive-looking face. Occasionally their chirping can be heard during the day, especially in cloudy weather, but they are at their best as musicians of the night, playing their singular and appealing serenade of which Hawthorne exclaimed, "If moonlight could be heard, it would sound like that." It could not be better said.

HOW TO MAKE A WINTER GARDEN

BY JENNIE M. MILLS

It may seem a bit early to talk of winter and winter gardens but forethought is the secret of success in this case. Although Miss Mills found her garden a favorite in the schoolroom it can be equally enjoyed in the home after winter has closed in.

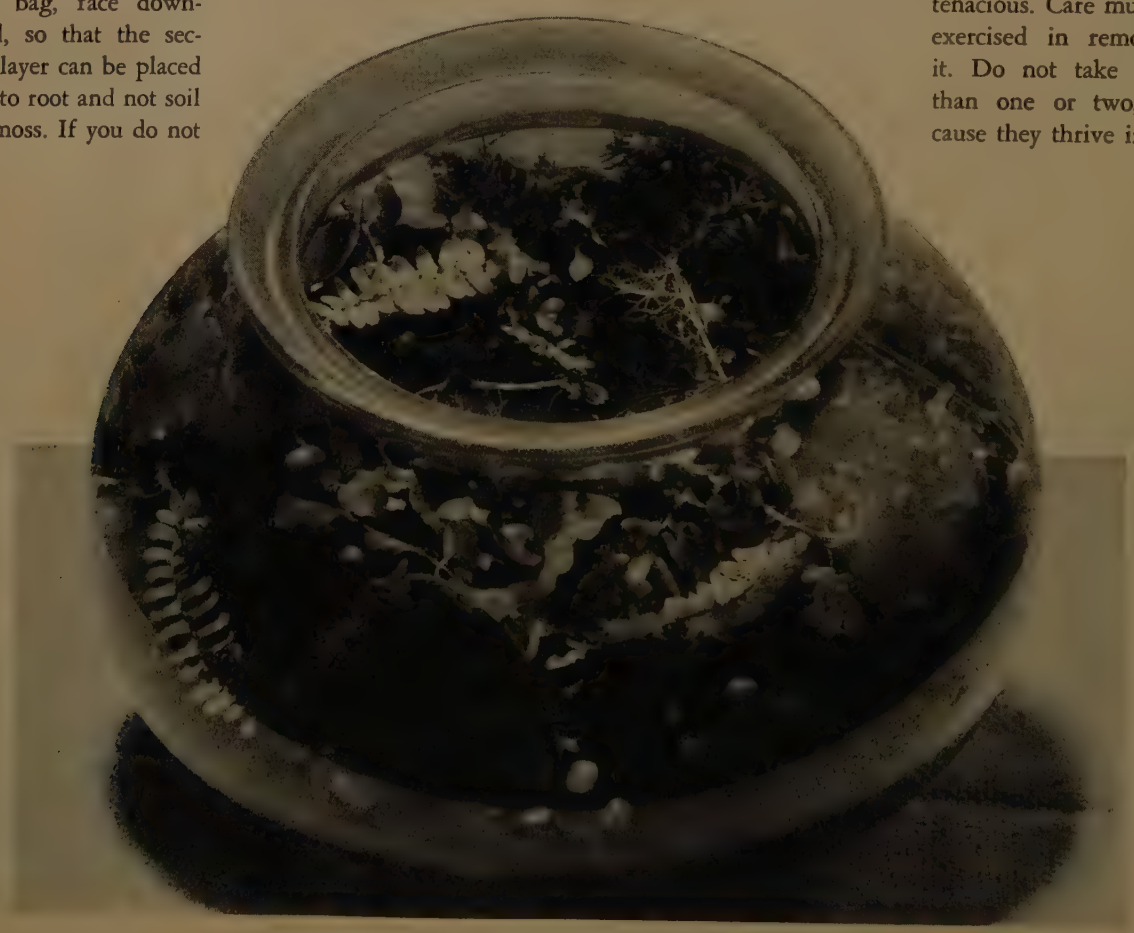
All last winter, when white storms swirled about my schoolroom windows, I had upon my desk a tiny bit of the green forest. Inclosed in a glass bowl were a little moss, a few ferns and berries, a half-dozen other tiny plants—my winter garden. If you love the dim silence of forests and enjoy bending among tiny growing things, you, too, may make a winter garden.

Select a bowl, just an ordinary glass fish-bowl. It may be any size, but I prefer one about twenty inches in circumference. Choose a clear, crisp day in the latter part of September, and take with you a strong paper bag. Hike or ride to the woods you know best. If you are the kind of person who cares to make a winter garden, you will know at least one woods well.

The first thing to look for is moss, not the dry lichen kind but the moist, plushy, green kind that grows in patches as large as your hand and looks like a fat little pin-cushion. The best way to gather moss is to flatten the back of your hand against the ground, run your fingers under it, and, presto, it is in your palm. Gather enough moss to cover the bottom of your bowl twice. Put the first layer into your bag, face downward, so that the second layer can be placed root to root and not soil the moss. If you do not have access to ground at home, take a little black earth with you but place it in a small bag alone.

The next thing to look for, and indeed the *pièce de résistance* in any winter garden, is the fern. You will need from two to five, according to the size of your bowl. "Sword" ferns may be used, but if you can find the dainty, finely-cut fern known as the maidenhair, by all means choose that. It is better not to use the taller species, such as the hay-scented. They spread too rapidly in the jar and grow spindly in the moist warmth. Sword ferns are a little more difficult to remove, because their roots are more tenacious and in danger of being broken when lifted; but the maidenhair needs but one jerk of the practised finger and up it comes in all its beauty. Be sure not to take more than you really need, or next year you will seek their haunts in vain.

Another plant necessary for a proper winter garden is the striped wintergreen. It is a straight little plant, about as tall as your little finger, with glossy, pointed leaves, white-veined, and, later, bearing berries resembling the wintergreen berry. It loves to snuggle among the rocks and fallen leaves and is tenacious. Care must be exercised in removing it. Do not take more than one or two, because they thrive in the



glass, and, besides, in some woods they are rather scarce.

Now the real fun begins, you have your background and are at liberty to look for the little odds and ends, curious bits of this and that, which make a winter garden different. Usually my search is rewarded by finding the rattlesnake weed, a small plant, with gray-green, fleshy leaves flattened on the ground. Sometimes I find a small hairy-leaved plant, the name of which I have been unable to discover, and which the children call "downy leaf." Another interesting little thing is a plant with powdery-looking leaves, resembling the "dusty miller" of our grandmothers' gardens, in miniature.

Be sure and do not leave the woods without the vine we call the "Indian tea-berry." A winter garden would not be a winter garden without these! The vine, with its round green leaves, white-veined and about half as large as a child's finger nail, creeps on the ground. It is also known as the partridge berry.

Now you are ready to leave the woods with your treasures. Be sure that your bowl is sparkling clean. First put in a layer of moss, face down, so that the "pretty side" may be seen outside; do not let the moss extend more than quarter way up the side of the jar. Sift in some of the earth—not much because these plants do not require much root. Now plant your ferns, the largest in the center, or any way it pleases your fancy. The striped wintergreen is planted next. Then take another layer of moss, face upward this time, and lay it over the earth and the roots of the plants, piece by piece. After this is done, you may add your little "odds and ends." Last year I planted an acorn and, before spring, there was a tiny oak tree growing in my winter garden. Later I removed it to the back yard, where it is waiting to be transferred to a more suitable spot. One year I had violets blooming at Christmas and, another time, furry hepaticas in January. These surprises are one of the pleasures of a winter garden.

After all the "odds and ends" have been tucked away between the pieces of moss, add the tea-berries, anywhere or everywhere. You cannot have too many of these glowing bits of cheer, wreathing the sides of the bowl, peeping between the moss and the plants.

Last of all, moisten the garden. Be careful not to wet it so that the roots of the plants are drowned; neither must it be too dry. If the moss feels spongy to the touch, you have struck the happy medium. Place a flat piece of glass over the top of the bowl to keep in the moisture, set it where you wish, and enjoy it the rest of the winter. You will not need to add water, and the plants will reach and spread in fairy beauty. The children called mine "Little Fairy Land," and I did not correct them because, perhaps, on white nights, when the forest is locked in ice, the fairies did hold their revels in my little winter garden! You may be lucky and catch them at it.

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JACK THE LIFESAVER

BY VICTOR KUTCHIN

It was a cold night. The wind whistled around the house and through the trees. The family of Mrs. Henry Champlain were all snug in bed in their Biloxi, Mississippi, home.

In the middle of the night, above the whistling of the wind, Mrs. Champlain was awakened by a scratching and banging on the kitchen door. She listened. The noise continued. Perhaps it was Jack, who spent his nights in his bed in the barn. Perhaps Jack, police dog and hardy adventurer though he was, wanted the warmth of the kitchen stove. The noise continued. Mrs. Champlain went down stairs and opened the kitchen door. In walked Jack. In his mouth he held a half-grown kitten, chilled and wretched. His mistress took the poor little waif to warm it. She found the fur on its neck so wet that Jack must have carried it quite a distance. Jack stood watching while the kitten was petted until it lay by the stove and purred. Then he went back to his bed in the barn.

The kitten stayed in the family. It was named Fuzzy. It followed Jack about, his almost constant companion. When Jack was given Dog World's International Diploma of Honor, the kitten must have wished to shout with approval for she could testify to his worth.

But there is a sad ending. Jack died recently, apparently the victim of some enemy who had added ground glass to food given him. Such people will have a debt to pay sometime. And Fuzzy is heartbroken, staying by Jack's grave unable to understand where he has gone and why he does not come back and play as he used to do.

BEAUTY THROUGH THE MICROSCOPE

BY JOHN E. WILLARD

MOONLIGHT THROUGH THE BRANCHES OF A "LEAD TREE"

An effect gained by adjustment of the condensing lens of the microscope when viewing the strange formations resulting from silver nitrate and zinc working together to make beautiful patterns

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WHAT A DROP OF SILVER NITRATE CAN CREATE

The chemical dropped on zinc will dissolve the metal and the silver will come out of the solution and form such a "silver tree". Through the microscope it suggests an attractive black and white design

IN RECENT years the art of photography has found a new source of subject matter in skyscrapers, metropolitan skylines, factories and machines. This material has lent itself to effects of design and line that are startlingly fascinating while at the same time expressing the tempo of modern life.

To everyone with an observing eye and mind the artistic possibilities of this type of subject are apparent. The extent to which it is being treated indicates a desire on the part of those who create with the camera to test new fields and introduce freshness into their work. For those who have this desire for experiment there awaits a field into which few have yet ventured with the cause of art in mind. This is the field of photomicrography, which heretofore has been the domain of the scientist who was interested in the microscope solely as a means of determining the properties of minutely small things.

The very fact that many of the formations which are invisible to the naked eye occur in accordance with definite laws suggests that they might form the basis for art patterns. A few hours of actual manipulation of the microscope with crystalline subjects overwhelms one with the great unexploited possibilities of this field.

For instance, a drop of salt water made by mixing a few grains from the dining table shaker with water will, when evaporated, leave a residue which when magnified a hundred times by a microscope shows an arrangement of small, square, ribbed units that gives the observer a true esthetic thrill. The effect of this arrangement may be indefinitely varied by variations of illumination. One tilt of the mirror illuminates the whole subject evenly, another concentrates the light in one portion of the field of view; one throws the shadows to the left of the crystals, another to the right. Each change in the position of the mirror or the focus of the condensing lens brings out new highlights and causes other parts of the units to fade into the background.

If the chemist is enlisted in the cause he may substitute a drop of silver nitrate for the common salt. Then the microscope will show a formation of needle-like ribs from which grow out other fine needles, jagged teeth and triangular masses. It requires a most blasé observer to suppress a sudden feeling of exultation when he shifts the illumination on this scene for the first time. He has the sense of soaring rapidly through a weird, fantastic, and tremendously beautiful world of which he had not dreamed. The light from his mirror as it comes in color from the color filter is refracted and absorbed by the crystals to form a series

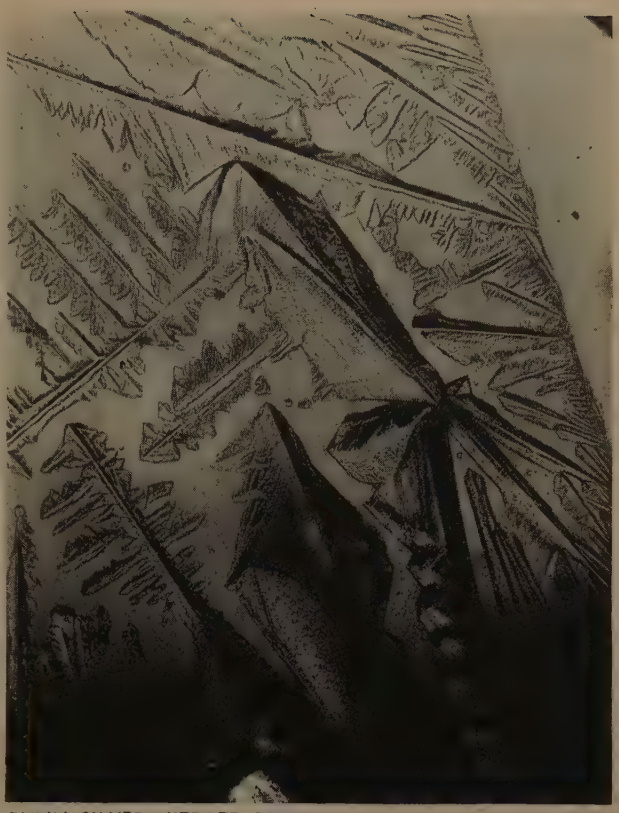
of exotic shades that give rare delight to the eye.

If, instead of allowing the drop of silver nitrate to evaporate, the chemist places in it a small piece of zinc, the zinc will dissolve and the silver from the silver nitrate will come out of the solution, forming a "silver tree" as it does so. This "tree" is constructed of crystals of the metal branching out from one another in the fashion of the leaves and branches of a tree. When viewed through the microscope it is suggestive of a most attractive black and white tapestry design. If one desires an impression of moonlight he may change the elevation of the condensing lens of his instrument until the light is concentrated in a small circular portion of the field of view and there he will see the moon through the trees; fantastic trees, and weird moonlight, but none the less romantic.

Once the subject has been focused in the microscope it requires only a small amount of additional equipment and some practice to photograph it well. It is convenient to use an adjustable bellows the bottom of which fits over the eyepiece of the microscope and the top of which carries a ground glass screen which may be replaced by a photographic plate. In order to avoid focusing difficulties caused by the unequal action of the lenses on the different colors in white light a single pure color, such as blue, is obtained for illumination by passing the light from the arc or bulb source through a colored glass. The image is focused on the ground glass which is then replaced by the plate. The desired exposure is given and the image is ready to be developed.

Whereas interesting effects may be obtained with subjects such as those discussed by sending the light up through them from the mirror at the base of the microscope, it is necessary to utilize illumination from above for highly opaque bodies. The more the instrument is refined and the more the technique of manipulation is improved the greater the number and perfection of the effects possible.

When a gas or a liquid slowly condenses to a solid state, or when a salt is obtained by evaporating the solution in which it is present, the solid formed is made up of units bounded by plane surfaces which intersect at perfectly definite angles. These units are the crystals of which we have been speaking. The crystalographer believes them to be built up in a regular manner from structural units such as atoms and molecules. He classifies them in seven systems according to certain axes. Each system contains different geometrical forms. These and the different arrangements and sizes in which they may occur form a definite contribution to beauty.



PLAIN SILVER NITRATE CRYSTALS

Actually, however, the word "plain" is not appropriate since it belittles the formation revealed to the observer who looks through the microscope

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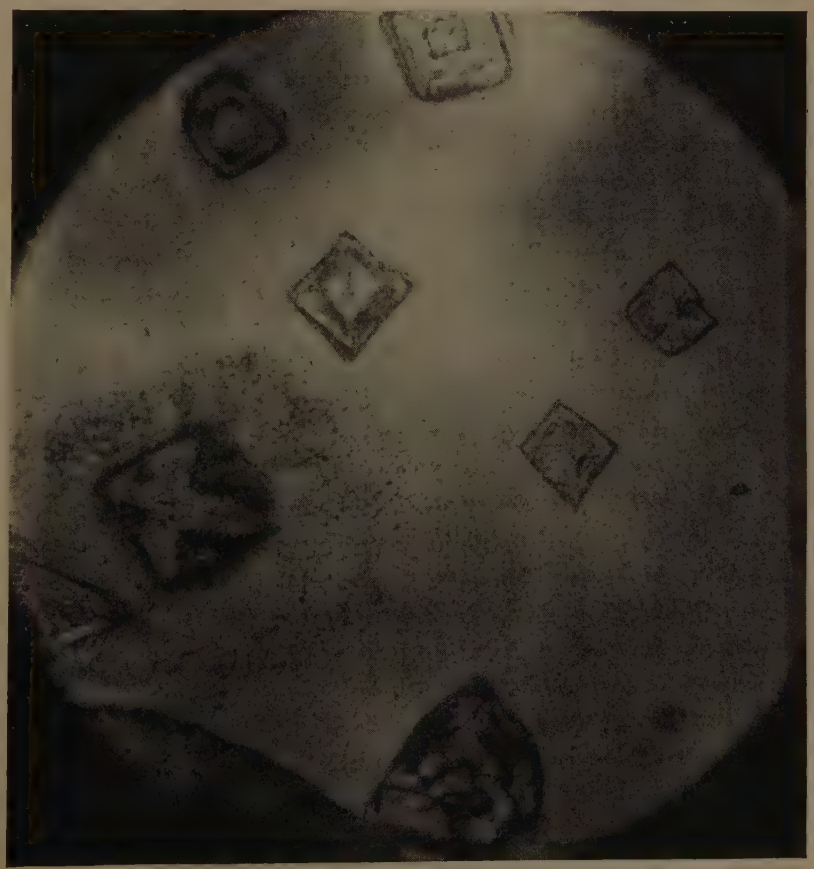
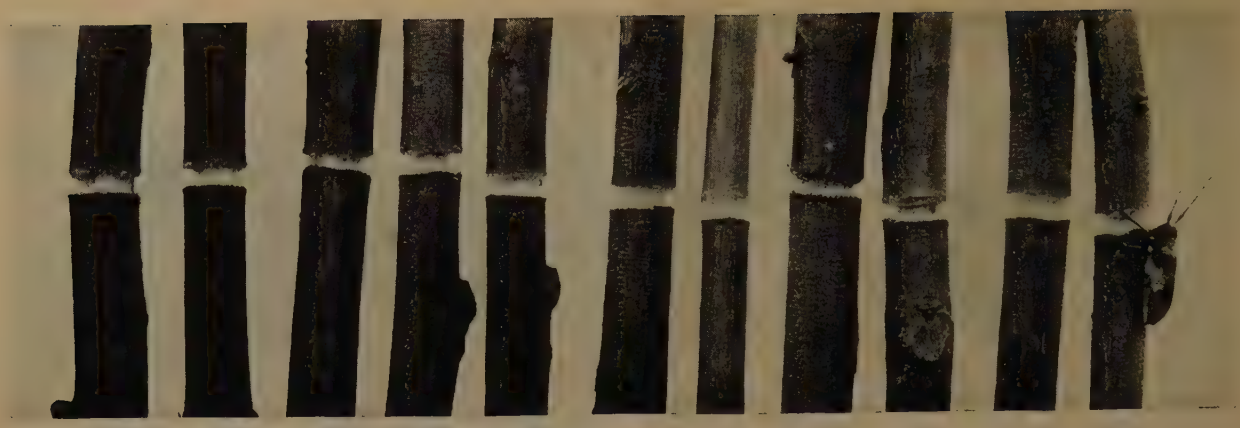
AFTER SALT WATER HAS EVAPORATED

Interesting and lovely square ribbed units are left suggesting different designs. The effect is heightened and varied by manipulating the microscope





THE GIRDLING WORK OF ONE FEMALE GIRDER BEETLE
At the right may be seen the insect artisan who accomplished this task and who laid fifty-five eggs above the girdle in these twigs carefully killed for use as a beetle cradle

A BEETLE THAT HEWS TO THE LINE

BY FRED E. BROOKS

PHOTOGRAPHS BY THE AUTHOR

We have several species of forest insects, which, in order to live normally and successfully, must have dead or dying twigs of trees in which to pass certain periods of their existence. Dying wood is essential to such insects for the reason that wood is their food and their covering, and they must avoid live, vigorous growth in which their delicate eggs or tender larvae might be flooded with sap or crushed by the expanding tissues. Some of the insects to which dead twigs are a necessity take their chances of finding branches that are dying from various natural causes and set up their habitations therein; others deliberately go about killing the twigs which they need for their domiciles.

Among those insects, which, seemingly, with a good deal of intelligence and foresight kill twigs for their own future needs or the needs of their offspring, none is more interesting than the so-called twig-girdler, *Oncideres cingulatus*. The habits of this medium-sized, ash-colored beetle are so unique that one may almost overlook the damage it does in wondering at its peculiar behavior. Occasionally, especially in the south, a great amount of injury is done by the twig-girdler beetles in killing the bearing branches and the young trees of valuable hickories and pecans.

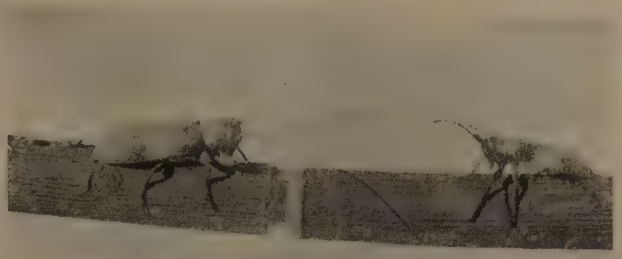
In accordance with ancient precedent, we may charge the blame against the female of the species. She alone has in some mysterious way acquired the wisdom that tells her a girdle cut through the bark and sapwood of a stem or branch will kill that part of the plant above the injury. The male does not need this wisdom, therefore he has never acquired it, although for ages he has watched his mate eat of the forbidden fruit. I suppose if he could be benefited in any way by girdling twigs and yet did not do it, we might credit him either with superior goodness or superior dumbness. For a good many years I have carefully watched the twig-girdlers in their various activities and confess to a real liking for the intelligent, however pestiferous, little animals. A meddlesome female one time left a whole woodsfull of the most luscious hickory twigs to attack and kill a little shagbark hickory tree which I had purchased and planted and which I valued at somewhere around five dollars. For that deed my wrath burned temporarily.

STAKING A CLAIM
The female will make identifying marks on her twig, seeming to keep off all others

At that season of the year when forest leaves are coloring and nuts are dropping, there come to us the twig-girdlers in their full-grown beetlehood. They are nearly an inch in length, have long feelers or antennae, which they are wont to keep in motion, and they normally hide themselves against the gray background of hickory bark. If you are sufficiently keen-eyed to discover one of the beetles, and attempt to lift it from its position, it may pinch you with its strong jaws. It will also protest with audible squeaks and cling so tightly to the bark that its legs will be in danger of pulling off before it will let go. One time I held one of the beetles in my fingers while I allowed its free legs to clasp a piece of wood.

When I lifted, the beetle seemed easily to hold the piece of wood aloft, although the wood was a hundred times the weight of the beetle. I figured that if I were as strong according to weight as the beetle I could easily lift a good-sized hickory tree by hand.

The twig-girdler beetles occur rather commonly in late summer and autumn throughout most of the eastern part of the United States where hickory and pecan trees grow. They are more abundant south of the latitude of Virginia and Missouri than northward, for the reason that they breed more rapidly where the summers are long. South of the general region of Richmond, Va., the eggs hatch and the grubs develop to the mature or beetle stage within twelve months, while northward about twenty-four months are required for the transformation from egg to adult. This results in at least twice as many beetles being produced in the south as in the north.



LOOKING OVER THE WORK DONE

A meddlesome female twig girdler left the woods to girdle and kill a small shagbark hickory that the author had in his yard and valued at five dollars

Within a few days after the beetles make their appearance, the urge to egg-laying comes upon the female. She forthwith selects a branch or stem about half an inch in diameter, usually of some species of hickory, and with her sharp jaws begins to bite out small pieces of bark and wood. Soon she excavates a deep cavity or pit and this she extends sideways by cutting out an adjoining section. This is repeated until, finally, the cut is made to extend entirely around the branch, in the form of a symmetrical girdle that looks like the job of an accomplished workman.

The task of making the girdle is the work of hours, and, usually, of several days. It goes forward faster during bright, warm days than in dark weather, and is not continued through the night. When showers or darkness overtake the beetle at her task, she quits work and rests in some near sheltered place. Work is resumed in the same spot when favorable weather returns. When the girdle is completed the beetle moves up on the now deadened twig and proceeds to lay her eggs beneath the bark. In placing her eggs, the beetle sinks her jaws deep into the bark just below a bud or sidebranch. She then turns and forces her strong ovipositor into the opening and lays a single egg between the bark and wood. When the egg is in place, the insect withdraws her ovipositor and deposits a small mass of glue-like liquid in the entrance. This substance soon hardens and effectively seals the space about the egg.

The real purpose and need of the seal were realized, when, watching through a microscope, I discovered several kinds of minute, winged parasites actually working their way to the egg and depositing their own eggs within those of the host insect or upon the newly-hatched larvae. I found six species attempting to get at the eggs, all of them species new to science and all having generic names in length out of all proportion to the size of the insects which bore them. When I removed the protecting plug from the egg chambers, mites and parasites soon found their way in and made short work of the girdler eggs.

One day in September I caught a newly-issued female girdler beetle and confined her, with a male companion, in a roomy, woven-wire cage set over a young, freely-branching hickory tree. I kept close watch of the beetle as she proceeded daily to toil at her life-work of making girdles and laying eggs. She lived and wrought until the middle of November. Then, from her deathbed, I took her and set her on one of the eleven twigs which she had girdled, and made her picture. Not only had she chiseled out the hard wood for the eleven girdles, but she had deposited fifty-five eggs in the deadened twigs.

The life cycle of the insect may be briefly stated. The eggs placed in the twigs soon hatch, and the grubs which come from them feed on the dying wood until winter stops their activities. Feeding is resumed in the spring and is continued until the larvae are full grown. Then, in mid-summer, the grubs form open spaces in their burrows and change, first to pupae and then to adults. After resting within their cells for several days, the young

beetles gnaw holes through the bark and escape. Very soon after they appear on the wing the beetles take food from the tender bark of twigs and the stems of leaves. They then pair, and the females take up their work of killing twigs and laying eggs.

There is one peculiar act of the female beetles which all observers of the species mention, but whose meaning is not clear. While the female is engaged in making her girdle she frequently pauses in her work and moves along the twig, making short excursions both above and below her girdle, during which she bites shallow marks and lines in the bark. These marks show on all girdled twigs. It seems to me that these are ownership marks. I have frequently observed wandering females, evidently seeking suitable twigs in which to set up their egg-laying operations, come to a branch already preempted. At such times I have seen the newcomer examine casually the marks made by the original owner of the twig and then crawl away. Never have I seen a beetle set up claim to an already occupied twig. At times, the beetles of both sexes meet and fight viciously, with a single clip of the jaws often severing legs or antennae, but I have never observed two females quarreling over the property right of a twig bearing marks of previous ownership by one of the individuals.

Perhaps if these lowly insects did not show such marks of intelligence in killing twigs by the process of girdling and in protecting their offspring from marauding enemies by sealing them up in tight quarters, one might not have the temerity to claim for them the respect for property rights that is here made. When one begins to speculate on the mysterious actions of insects he soon becomes lost in a cloud of interrogations. He knows neither the beginning nor the ending of their wisdom, nor, indeed, whether they have any wisdom. Samuel Johnson says—"I don't believe in ghosts, but I'm mortally afeard of them." Well, I don't believe in the wisdom of insects, but I have seen them display some remarkable wisdom.

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A MYSTERIOUS INFLUENCE

BY S. F. AARON

AMONG lowly creatures there are certain impulses altogether beyond our understanding as to causes, though we may clearly see their value. An example of this involves the parasitism of plant lice. The simple act of the tiny wasps—*Aphidius, Praon* and *Trioxys*—in laying their eggs in the bodies of the aphids, the hatching of these eggs, and the rapid growth of the maggots to the pupal condition and winged state, are readily observed and understood. The behavior of the individual plant louse when acting as host to the baby wasp is quite another matter upon which to philosophize.

All plant lice are notably gregarious, a habit largely influenced, no doubt, by their friends and cultivators, the ants. Most creatures, including man, flock for purposes of mutual protection, offensive or defensive, but aphids are quite outside any such possibility, though they are none the less inclined to crowd together, of all ages and both sexes. What then must be the impression when we see certain individuals otherwise inclined?

PARASITE FLY AND PLANT LOUSE

Above is the tiny insect that passes its immature stages in the aphid; at the left an aphid from which the fly has emerged; at the right a normal one

Invariably a parasitized plant louse turns away from its fellows and wanders off by itself, commonly to some length, which might be a mile or more in proportion to man's stature. Away from the colony on stem or leaf the poor thing travels to the extreme end of some neighboring twig or leaflet not inhabited by its kind and there ensconced it rests, suffers a horrible martyrdom and dies alone.

Beyond doubt this habit benefits the larval parasite within the body of the aphid, because it is then no longer in common danger of being eaten by other and external enemies, as the *Chrysopa* and ladybug larvae and those of the syrphus-fly. But how is the plant louse influenced to make this journey when it feels itself filled with its certain doom? The maggot of the tiny wasp is eyeless, legless, armless, no doubt unconscious of direction or actual intent in the matter. In any case the aphid cannot be steered or directed. But here might seem to be mental suggestion of very high order, as though the parasite might say:

"I am comfortably dining upon your insides, but in no way as yet interfering with your locomotor appendages; you are doomed, so kindly travel, as I prefer to be quite alone and not to be eaten in turn by some other insect."

BRINGING A PREMATURE SPRINGTIME TO THE WINDOW JUNGLE
Each week the children, like young deities, gazed down upon the jungle with tender eyes, now and then providing a warm spring shower

MORE ABOUT A WINDOW JUNGLE

BY MARION STAPLES HALLER

PHOTOGRAPHS BY THE AUTHOR

ONCE initiated into the thrills of adventuring in a window jungle and learning of the wonders of metamorphosis by personal observation, the natural urge is to continue the experiment with a wider variety of the small creatures of the garden, woods and stream, which can adapt themselves to terra aquarium life.

We almost stole our own thunder in the January "Adventures in a Window Jungle", when we inadvertently interposed the following aside in true Shakespearean manner. "This year the children have gathered even a motlier collection of larvae. In fact, the thrilling success of this first venture of our two budding naturalists has inspired them to create, also, a terrarium of veritable Noah's Ark proportions. Our pet frog from the swimming pool, a duet of jolly crickets, a handsome gold and black spider, a pair of dashing crimson salamanders—but, gracious me, this is another story!" True enough, and here is the rest of it now.

In the January issue Mrs. Haller told of the interesting experience with a window jungle and hinted that there was more to be told. There was, indeed, and here we have some more adventures of equal interest. Here is something that any parents can undertake and more than likely they will enjoy it fully as much as do the youngsters.

In addition to this fair start in the collection of a menagerie, the children gathered also, before the fall frosts sent these little creatures into hibernation, three more salamanders, a pair of green and yellow

"GRAMP", SEDATE PATRIARCH OF THE TERRARIUM FROG FAMILY
He is particularly fond of a diet of earthworms, which he devours with atrocious table manners, using his front paw to cram them in

newts, two tiny turtles, two garter snakes five and six inches long, a nine-inch water snake, a droning swarm of honey bees and hornets, numerous caterpillars and grasshoppers, a water snail as a scavanger for the pool, and four frogs. These frogs ranged in size from "Gramp", the wise and portly patriarch of the frog family and summer pet from the swimming pool, to an infinitesimal young froglet, who had but recently lost his tadpole tail.

The window greenhouse, which had so amply housed the larvae and moths last winter, was disturbingly inadequate for this gathering throng. In order to obviate the shocking slum conditions that promised to spell disaster to our new project, we had a local mill and hardware store build the "veritable Noah's Ark" according to our specifications. It cost ten dollars. This was an imposing structure mounted on a sturdy base and painted a soft leaf green, the box itself measuring forty inches long by eighteen inches wide by twenty inches high, with a glass front for easy observation of its interior, and screening on the remaining three sides, and a hinged cover. This escape-proof box was fitted with a water-tight galvanized liner six inches deep in which to establish the self maintaining plant life as a background and home for our minute denizens of the wild.

Setting our Nature study stage, before ushering in the animals two by two, was an adventure in itself, in which mother and dad as well as the children unleashed to their hearts' content their natural creative abilities and dormant landscaping genius. Before spreading a two-inch layer of cinders and sand for drainage and filling the remaining space in the liner to within half an inch of its top edge with rich, black loam from the woods, a large, oval roaster six inches deep was set in place for the sylvan pool and gardening proceedings were carried on around it, to build a natural habitat.

On our trip to the woods for loam, we had gathered also, taking care to disturb roots as little as possible, a quantity of moss for ground cover, several ten- to twelve-inch seedlings of white pine and hemlock, small ferns, and to add a bit of woodland atmosphere and provide natural retreats for our wild guests, some interesting mossy stones and gnarled pieces of lichen-covered stumps. From this assortment of material gradually emerged so charming and realistic a bit of wooded glade and pool that its creators were awed by their own handiwork.

At last, after a final gentle watering of the established moss and plants and filling of the pool in which, beside a floor of pebbles and a few large sitting rocks, a number of water plants had been rooted and anchored under stones, the menagerie started its grand march into its new, commodious quarters. Here, immediately, our pets of the wild found a world to their own liking, each seeking its own natural abode, so matter-of-factly, indeed, that their fascinated spectators were appalled by their own foresight in building a jungle better than they had realized.

This smug satisfaction in having successfully created a world in miniature was suddenly replaced, however, by alarm and increasing dismay, as before us was being enacted the inevitable drama of survival of the fittest. The five frogs were leaping lightly hither and yon about the jungle and with an expert flick of the tongue were devouring chirping crickets, the prized gold and black spider, grasshoppers, and even the hornets and bees, though these must have been a hot mouthful! Some of the woolly caterpillars seeking a cozy corner for their cocoons disappeared also into the cavernous mouths of the voracious frogs. Our insect population in the window jungle was reduced to the vanishing point in two days and still the frogs had that hungry look in their eyes. Finally two of the red salamanders darted down to the pool only to meet the fate of their insect neighbors.

Something must be done at once, or our menagerie would soon be reduced to frogs! From a zoology text book we learned that in addition to insects, the diet of frogs included earthworms. So with renewed hopes two young wild life conservationists rushed off to the garden armed with spades and a pail. When the few sample worms met with the immediate approval of our hungry amphibians, we rejoiced that our jungle food problem had been solved so easily. Therefore, some hundred angle worms were established in the rich loam of the jungle as provisions for the long winter, and this proved a most

satisfactory arrangement. In addition to supplying the frogs' needs, the worms were relished by turtles, snakes, newts and salamanders alike. If, occasionally, the worms failed to emerge frequently enough in discharging earth from their subterranean passage, we would dig gently for them with a blunt spoon and present each jungle dweller with a wriggling morsel. Because of this hand feeding as well as gentle petting and handling, the frogs in particular soon became unbelievably tame. They all would make overtures to have their sides tickled when we were admiring them, and "Gramp" would crawl with dignity upon an inviting hand when it was put into the pool.

From this intimate daily contact and observation of these little creatures of the jungle, the children learned many things. The natural habits of these various animals became as familiar to them as the idiosyncrasies of friends. Although the window jungle was under almost constant observation, its inmates went about their own interesting affairs undisturbed by and apparently unconscious of an audience actively interested in them.

THE POOL FORMED BY A ROASTER SUNK IN THE SOIL

The turtles, snakes and frogs all enjoy basking in the winter sunshine, and plants in the pool keep the water fresh and always clear

When a blizzard outside the window and a slightly lowered house temperature convinced the jungle folk it was time to hibernate, the children had a box seat for the affair and watched proceedings with eager interest. The frogs deserted the chilly pool and started digging themselves backward into the earth. They accomplished this by doing a most amusing and fancy trick with their hind feet, digging their way underground backward until they disappeared.

Curiosity led us to uncover one of these frogs while he was slumbering in his underground bed. His change in appearance was so startling that we feared he must be dead. His normally protruding eyes were closed and drawn into his head, his hind legs were drawn up close under him, and his front feet were tucked under his chin; but most surprising of all, his whole body seemed flat, shrunken and lifeless. So alarmed were we by our discovery that we lifted the frog from his earthy bed. Slowly one bright, golden eye, resuming its normal appearance, opened and gazed on us reproachfully. Thus reassured of our pet's safety, we hastily returned him to his bed and tucked him in to finish his nap.

The turtles chose to retire head first beneath the surface of the earth, and sometimes buried themselves at least two inches deep.

The newts, and the red salamanders, which are actually merely an earlier stage in the development of the adult newt, were the only consistent hibernators in the jungle. By the end of November they disappeared and came forth only at five- or six-week intervals on unusually warm, sunny days for a brief sun bath, dip in the pool and bit of food, then back under their protecting rock or stump they scuttled for another siesta.

The snakes, although they were all of different heritage, felt so close a bond in common that they all shared together a den beneath the largest mossy rock in a corner of the terra aquarium. This rock was so outstandingly the snakes' headquarters, that it soon became known as Snake Rock. The snakes would stretch luxuriantly for their sun baths always on or near this rock; when winter seemed to threaten, they withdrew silently and without ado to their cozy den beneath it.

The few larvae, which had managed to escape the frogs, had long since tucked themselves away in snug cocoons for that long, sound sleep of metamorphosis.

The lone snail in the pool might have introduced us

MOSS-COVERED SNAKE ROCK WAS THE HEADQUARTERS OF THREE MINIATURE REPTILES
They always sunned themselves on or near it and established their den beneath it. The water snake is on the fern and the other two are plainly visible

to still another method of hibernating if the two turtles had not developed a true French appetite for this type of delicacy and robbed the snail shell of its inmate. We expected the water in the pool might need occasional changing after this minor catastrophe, but the growing aquatic plants proved quite capable to carry on alone in keeping the pool fresh and sparkling.

When the sun shines warmly on this sleeping little world after several days of hibernation, the children take delight in augmenting these spring conditions by sprinkling jungle and pool with warm water from the garden watering pot. The moist, warm earth teeming in the sunshine has the actual smell of spring. Soon, here and there, a bright green nose pokes through the soil, then golden, blinking eyes, and presently the pool is full of jolly frogs, so sure that spring has come that they welcome it intermittently with their creaking jubilee, which ranges from falsetto to base depending on the size of the songster.

Following the frogs in this general revival meeting come the turtles with a mound of earth on their backs, the snakes, and occasionally the newts and salamanders.

Often at this time the frogs further celebrate by shedding an old suit for a dashing new one. To do this they soak in the pool, then start the tedious task of extricating themselves from their skin-tight costume. In their struggle, they wriggle and twist and rub their fore feet repeatedly down over their arms, as though they were removing long gloves. Soon the old skin loosens like a veil about the frog. At this stage the hungry newts and turtles join the tussle by tugging at the phantom frog and making off with choice morsels of cast-off clothing. The frog seems quite amenable to this free valet service in his arduous task, and the newts and turtles seem quite as pleased with the easy meal.

One day this spring the children, much disturbed by the strange appearance of one of the snakes, came rushing from the window jungle with the astonishing announcement that a snake was losing its stocking! Surely, it did look that way. The six-inch garter snake was slipping head first out of his skin. His head and two inches of his slender body were free of the old casing, which had rumpled about his waist in quite the untidy fashion of a descending stocking. No jungle neighbors coveted the snake's cast-off clothing, however, and for three days the snake wriggled through narrow passes, dragged himself over the rough moss and rubbed his back on the tree branches before he freed himself from his impeding,

transparent casing. In spite of these heroic efforts to be rid of his old skin, the snake seemed to feel a real affection for it after he had gained his freedom, entwining himself in it and resting thus for hours. To show the actual scale marks on this cellophane-like casing, we transferred the snake and his skin to a white background for a close-up portrait.

Although it is the general belief that many creatures that shed their skins dispose of them economically by eating them themselves, this has never happened to our knowledge in the window jungle. The frogs sometimes use their mouth to loosen or help tug off their old skin, but they promptly spit it out when they have accomplished their task. Perhaps only the toads do this act.

The astonishing amount of Nature lore the children have learned from the window jungle would alone make this experiment well worth while; but of greater value still is the friendly, inquiring attitude two young naturalists have developed toward their lesser brethren of the woods. A winter of gentle, loving ministering to the needs of these small, wild creatures in their care has, we hope and believe, created a life-long protective instinct in two normal children, which will ever make them abhor and thwart the hunter's gun, and will add much to their enjoyment and appreciation of the living world about them. Surely this is a most worthwhile result.

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A FLYING SQUIRREL MOTHER

BY PERCY A. MORRIS

WHILE walking through a swampy piece of woodland last summer, in the company of two other amateur Nature photographers, we noticed the standing trunk of a long-dead yellow birch tree. Near the top of this stub, perhaps ten feet above the ground, was a small round hole that quickly drew our interest.

From past experience we knew that the chances were very good that a flying squirrel was sleeping peacefully within that hole, and a gentle tapping at the base of the stump soon confirmed our belief. Not only one, but four flying squirrels scrambled out of the hole, a mother and her three young. The old one sailed gracefully off to the base of a nearby tree, but the young ones were too timid to trust themselves to the air, and, instead, climbed slowly down to the ground.

After their picture had been taken, we were at a loss to know what to do next as the birch stump was too fragile to permit putting them back in their nest, and obviously we could not go away and leave the three helpless young squirrels huddled together on the ground to become the prey of the first prowling cat that chanced by.

We decided that it would be best to remain quietly nearby and see if the mother would not find some way to get them back up the tree to their arboreal home.

We had not long to wait, for as soon as things had quieted down she returned and carefully nosed one of her babies over on its back, and laid her chin across its stomach. The young squirrel then clasped all four of its legs around her neck and hung on for dear life, while she climbed slowly up a nearby elm tree, holding her head well back so that the tender body of her offspring would not rub too harshly against the rough bark.

To the top of this elm tree she climbed, and then went out on a limb and, hesitating an instant, she launched herself into the air, with her youngster holding on entirely by its own power, and resembling a huge goitre on the neck of the sailing mother squirrel.

She made a long graceful glide, apparently in no way bothered by the extra weight, and concluded it with a perfect three-point landing on the side of an old chestnut tree fully seventy-five feet away. Up this tree she went, to disappear in an abandoned flicker hole.

Returning, she repeated the performance with the two remaining youngsters, whereupon we arose and went on our way, richer in our knowledge of the ways of the wood-folk and the instincts Nature gave them.

CAMP SITES—CAMP FIRES—CAMP FOOD

BY FAY WELCH

DIRECTOR, TANAGER LODGE CAMP; SPECIAL LECTURER IN CAMPING TECHNIQUE AT NEW YORK STATE COLLEGE OF FORESTRY, AT SYRACUSE, NEW YORK

ILLUSTRATED BY JEX

WHETHER afloat or afoot the camper who is on the move is daily confronted with the problem of selecting a suitable camp site. From mid-afternoon on, the canoeist paddling down the lake keeps a sharp lookout for a promising location. He scans the shore for woods open enough to provide space for pitching his tent, because, while he wants trees for protection, for fuel and to support the tent ropes, he also wants fair ventilation to reduce the number of insect pests and to enable tentage and ground cover to dry quickly after a rain.

The season of the year will exert a considerable influence upon his choice. If it is warm and "buggy" he is apt to pitch his tent on the end of a point or on a small island where the tree growth is not too thick and where he can take advantage of every breath of wind that stirs. But when colder weather prevails, he will seek protected bays where shore line and undergrowth combine to shelter him from searching winds.

Wherever he camps he will want to pitch his tent in such a way that it receives the direct rays of the sun for a few hours each day, preferably in the morning.

It was something more than sentiment or even religion that caused the Plains Indians always to pitch their tipis facing the east. One of the best camp sites I ever enjoyed was just above a spring on a little shelf on the eastern side of a hill. Here the sun, as soon as it topped the eastern ridges, shone bright and warm into my tipi. In a couple of hours all dew and dampness of the night had disappeared, and the sun had climbed to a point behind a big oak and for the remainder of the warm summer's day my tipi stood in cool shadows. But across the ravine tents were pitched on a western slope where at mid-forenoon the tall grass still was soaking wet with shining dew.

This is another article in the practical camping series begun with the March issue of Nature Magazine. So popular has been this feature that specially written articles on winter camping will follow, beginning next month.

A good camp site must be reasonably level, but with sufficient elevation to insure satisfactory drainage; there must be a supply of wood that burns well, and a dependable source of pure drinking water nearby.

Contaminated water is one of the real hazards that a camper encounters, and any water supply frequented by man is liable to be contaminated. Suspected water may be treated in any one of the following ways: First, boil actively for twenty minutes. Second, dissolve one Halazone tablet in each quart of water and allow the water to stand for half an hour before using. These tablets may be secured from drug stores, sporting goods stores or from the Abbott Laboratories, Chicago. Third, mix one teaspoonful of fresh calcium hypochlorite to a paste and dissolve in one quart of warm water. Add one teaspoonful of this stock solution to every two quarts of water to be disinfected and let the water stand for half an hour.

Lucky indeed is the camper whose site has a goodly supply of dead, dry wood. If, in addition, he is a skillful axeman and a clever fire builder the routine work connected with getting three meals each day will be marvelously lightened. Because efficient fire building is such an important part of good camping it may be well to set down here some facts

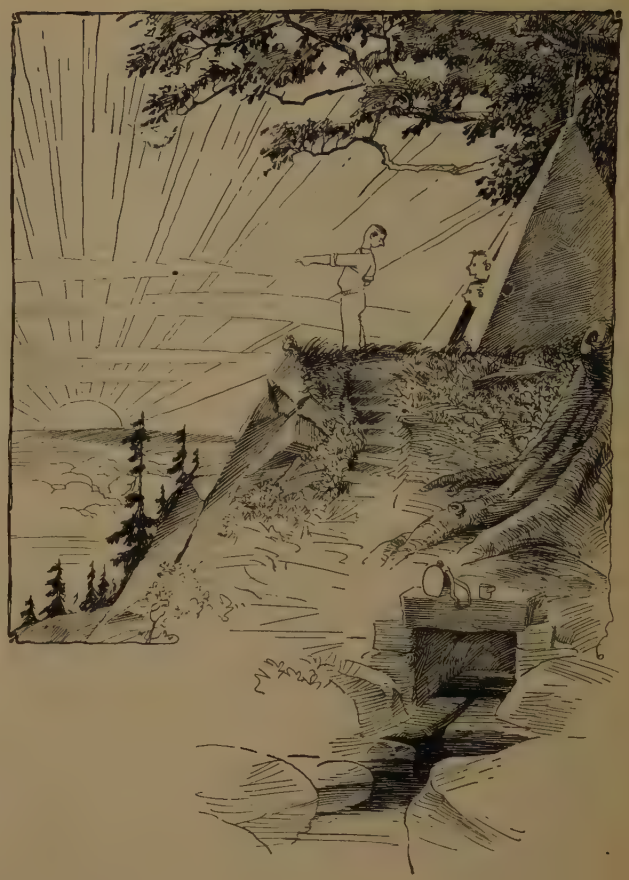
MENUS FOR TWO WEEKS

Breakfast	*Dinner*	*Supper*
	FIRST DAY	
Oranges Cooked Cereal Bread or Toast Butter Coffee	Tomato Soup (served as a drink) Fried Eggs and Ham Bread Butter Cookies	Fried Steak and Onions Boiled Potatoes Lettuce Bananas Bread Butter Tea
	SECOND DAY	
Grapefruit Cooked Cereal Flapjacks Brown Sugar Butter Coffee	Cheese Sandwiches Sliced Ham Sandwiches Pickles Chocolate Bar Oranges Cocoa	Weiners and Sauerkraut Fresh Carrots Bread Butter Cookies Tea
	THIRD DAY	
Oranges Cooked Cereal Fried Eggs Bread Butter Coffee	Spaghetti and Tomato Bacon Bread Butter Jam Apples Cocoa	Ham heated in Milk Green Beans Potatoes Biscuits Butter Pineapple Tea
	FOURTH DAY	
Tomato Juice Cooked Cereal Biscuits Butter Jam Coffee	Squaw Corn (Corn and bacon on toast) Cheese Biscuits Butter Cocoa	Fresh Fish Potatoes Beets Cornbread Jam Butter Tea
	FIFTH DAY	
Cooked Cereal with raisins Biscuits Butter Jam Coffee	Lima Beans with Tomato Puree and Bacon Biscuits Butter Peanut Butter Cocoa	Corned Beef Potatoes Onions Oatmeal Crackers Apples Tea Butter
	SIXTH DAY	
Dried Figs Cooked Cereal Biscuits Butter Bacon Coffee	Chopped Raisin, Nut and Mayonnaise Sandwiches Peanut Butter Sandwiches Pickles Cheese Pineapple	Fresh Fish Potatoes Green Beans Saltines Butter Cookies Tea
	SEVENTH DAY	
Cooked Cereal with raisins Biscuits Butter Jam Coffee	Baked Beans Ketchup Bacon Biscuits Butter Cocoa	Chipped Beef with Potatoes Beets Cornbread Jam Butter Tea
	EIGHTH DAY	
Oranges Cooked Cereal Bread Butter Coffee	Fried Eggs Bacon Bread Butter Cookies Cocoa	Steak Potatoes Celery Bread Butter Apples Tea

about fire woods. In general the fuel value of any wood varies according to the bone dry weight of that wood. In other words, there are many more heat units in a dry stick of hickory than in a dry stick of willow the same size. Of course the presence of resins in certain woods slightly modifies the above rule. It is also well to remember that the light woods make good kindlings because they are easy to split or whittle and they take fire quickly.

However, they burn rapidly and are soon consumed, leaving ashes rather than coals. The heavy woods take fire slowly, but once they are ignited burn steadily, leaving a deep bed of hot, glowing coals. Once, when preparing to roast a good-sized chicken, I added two five-inch sticks of dry white oak to my fire. They burned briskly and steadily for an hour and a quarter, and by that time the fowl was roasted to a turn.

Among the heavy woods are the hickories, oaks, black locust, ironwoods, yellow birch, beech, sugar maple, white ash and black walnut. Sycamore, soft maples, red pine and chestnut are among the medium weight woods, while white cedar (arbor vitae), balsam fir, willow, basswood, white pine, butternut and spruce are members of the light weight group. Splinters and shavings from any of the latter make excellent kindling. In parts of the forest where curls of bark from the yellow or canoe birches can be gathered without violating good principles of conservation (I assume none of you would peel the



Breakfast	*Dinner*	*Supper*
	NINTH DAY	
Apricots	Kidney Beans	Sardines
Cooked Cereal	Spinach	Bread
Bread	Oatmeal Crackers	Butter
Butter	Butter	Spaghetti with Tomato
Coffee	Apples	Flapjacks
	Cocoa	Brown Sugar
		Tea
	TENTH DAY	
Oranges	Squaw Corn	Corned Beef
Cooked Cereal	Bread	Potatoes
Bread	Butter	Pickles
Butter	Cheese	Cornbread
Coffee	Bananas	Jam
	Cocoa	Butter
		Tea
	ELEVENTH DAY	
Dried Figs	Baked Beans	Fresh Fish
Cooked Cereal	Bread	Potatoes
Biscuits	Butter	Fresh Carrots
Butter	Ketchup	Oatmeal Crackers
Coffee	Jam	Chocolate Bars
	Oatmeal Crackers	Butter
	Cocoa	Tea
	TWELFTH DAY	
Cereal cooked with dates	Minced Ham Sandwiches	Ham
Biscuits	Peanut Butter Sandwiches	Potatoes
Butter	Oranges	Peas
Coffee	Cocoa	Oatmeal Crackers
		Jam
		Butter
		Cookies
		Tea

Breakfast	*Dinner*	*Supper*
	THIRTEENTH DAY	
Grapefruit	Corn Chowder	Sweet Potatoes
Cooked Cereal	Oatmeal Crackers	Bacon
Biscuits	Flapjacks	Green Beans
Butter	Brown Sugar	Biscuits
Coffee	Pineapple	Jam
	Cocoa	Apricots
		Tea
	FOURTEENTH DAY	
Dates	Raisin, Nut and Mayonnaise Sandwiches	Fresh Fish
Cooked Cereal		Spaghetti and Tomato
Biscuits	Cheese Sandwiches	Cornbread
Butter	Pickles	Jam
Coffee	Chocolate Bars	Pineapple
	Dried Prunes	Butter
		Tea

FOOD LIST

Supplies Taken at the Beginning:

- 2 No. 2 beets*
- 1 lb. brown sugar
- 2 packages Bisquick
- 2 lbs. coffee
- 2 cups dry cocoa
- 1 can Crisco
- 1 package Cream of Wheat
- 30 cookies (in a can)
- 9 chocolate bars
- 2 No. 2 corn
- 2 No. 2 canned beef
- 2 packages oatmeal crackers
- 1 No. 2 corn chowder

Corn bread mixture:

- 4½ cups yellow cornmeal
- 1½ cups flour
- 1½ tsp. salt
- 12 tsp. baking powder
- 12 tbsp. fat
- 3 tbsp. sugar
- ½ lb. dried figs
- 2 No. 1 can jam
- 1 package Ralston
- 5 pounds potatoes
- 1 pint jar pickles
- 3 No. 2 cans spaghetti and tomato
- 1 lb. raisins
- 1 No. 1 peanut butter
- 1 lb. tea
- 1 No. 2 kidney beans
- 1 No. 2 spinach

living trees!) or where the fine dry twigs from dead hemlock, balsam, pine or spruce branches are available, or even where the finely shredded bark of red cedar or of small grape vine stems can be had, the kindling problem is greatly simplified. Always keep a cache of fine kindling and dry wood nearby against the proverbial rainy day, and also leave one for the camper who follows you.

Make certain that inflammable material is cleared away from the vicinity of your camp fire before lighting it, and ere you leave make sure your fire is completely extinguished. Also, if you smoke, be very careful of your matches and cigarette stubs or pipe ashes.

As to the tents you carry, let them be light and not too large. Balloon silk is a desirable fabric. When traveling in wooded country I never carry tentpoles, but depend on slinging my tent from trees by means of quarter inch ropes. I cut my pegs, and poles if necessary. Both the "Baker" (lean-to) and "A" type of tent prove satisfactory and are easily erected. The explorer's tent (resembling the "A" tent, only lower at one end) is practical. In cold weather a tent with a floor sewed in has its advantages. In such a tent I have made myself very comfortable on a cold autumn evening by carrying a frying pan full of coals into the tent and placing it on a flat stone. On another cold evening I used three or four hot rocks out of the fireplace for the same purpose. Mosquito bar fronts or door coverings on the tents are helpful, but not as effective as separate mosquito tent units that can be tucked in snugly all around your bed.

A camper is known by the condition in which he leaves his camp site. It should be the better because he stopped there, but unfortunately it frequently is not. The disposal of human waste is the most critical problem. In short, temporary camps, the simplest and most sanitary type of latrine consists of a trench not over ten inches wide, whose perpendicular sides are free from rootlets, and whose length and depth are sufficient so that when the time comes to break camp room remains to fill in a foot of earth. Of course each time it is used a layer of earth is added.

Put a handful of sticks on the fire after taking off the kettle of dishwater; then if care has been exercised to keep liquids out of the garbage, most of it can be burned. Especially difficult items, such as soggy oatmeal or left-over flapjack batter, can be consigned to the above mentioned trench. Tin cans should be burned out, pounded flat and buried. No bottles, jars, or glasses should be left in which water can collect, become stagnant and provide breeding places for mosquitoes. Much of the rubbish that so frequently litters sites could be burned easily if it were not allowed to accumulate.

For any trip of two weeks or less it pays to work out all menus in advance. Then a food list can be made from the menus. Many foods can be carried in the containers in which they are purchased. Waterproof canvas bags, available in sizes varying from a quarter pound to ten pounds, are convenient for bread mixtures, sugar, rice, salt, tea and so forth. It is wise to label each bag with a linen tag and indelible ink. When the ink is thoroughly dry the tags should be shellacked. Suction topped tins, lined with waxed paper, are good for butter, bacon and the like. A few round, waxed cardboard cartons should be included in which the remainder of the jam or similar substances can be packed once the original can in which they were contained has been opened. As the supplies are packed, it is well to list the contents of each pack on a large tag that is later tied to the pack. Supplies for the first few meals, of course, should go on top. If food supplies must be portaged, you will carry as little water as possible, working as far towards dried or dessicated foods as your palate and a consideration for well-balanced menus will permit.

The menus and food lists printed here were worked out by Miss Helen Strand of the College of Home Economics at Syracuse University, for a two weeks' canoe trip by a party of three. It was planned with the understanding that at the end of the first week it would be possible to secure certain fresh supplies at a little backwoods village.

For each breakfast, "cooked cereal" is listed without specifying the kind. Of course Cream of Wheat and Ralston, which are on the food list, could be alternated to suit the wishes of the campers, or other compact, nourishing cereals could be substituted. Coffee, cocoa, and tea have been arbitrarily set down as the daily beverages. Here again adjustments are easy. (Continued on page 191)

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1 small tin sardines
1 lb. white sugar
1 No. 1 minced ham
1 No. 2 peas
1 No. 2 sweet potatoes
1 package prepared pancake flour
7 lbs. dried milk
3 lbs. butter
9 oranges
1 can tomato soup
2 lbs. steak
1 lb. fresh onions
2 No. 1 cans grapefruit
1 head lettuce
3 bananas
4 lbs. smoked ham
1 No. 3 can weiners and sauerkraut
2 lbs. carrots
1 lb. bacon
6 apples
3 No. 2 green beans (string)
4 No. 1 canned pineapple
1 lb. American cheese
2 No. 1 tomato purée
2 No. 3 baked beans
1 4 or 8 ounce bottle ketchup
1 lb. saltines
1 lb. chipped beef
2 No. 2 can apricots
1 ½ pound package of dates
2 double loaves white bread
2 double loaves whole wheat or rye bread
¼ lb. salt

*No. 2 refers to the size of the can.

Additional Supplies to be Purchased at End of First Week:

2 lbs. butter
3 bananas
2 lbs. ham
1 lb. bacon
9 oranges
6 apples
6 eggs
1 lb. American cheese
5 lbs. potatoes
2 lbs. steak
1 bunch celery
1 lb. carrots
½ lb. dried prunes
2 double loaves white bread
2 double loaves whole wheat or rye bread
1 package pancake flour

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

LORE OF THE ZODIAC

BY ISABEL M. LEWIS

AN IMPORTANT region in the heavens is that defined by the narrow belt that extends along the ecliptic, or apparent path of the sun, and nine degrees on either side of it. This is known as the Zodiac, or Zone of Animals, so called because all of the constellations within it, with the exception of Libra, bear the name of living beings.

The width of the zodiac is determined by the extent to which the moon and the planets depart from the ecliptic. No one of these bodies will ever be found outside the bounds of the zodiac. So if one knows the constellations of the zodiac one knows where to look for the planets. Outlines of a few neighboring constellations come slightly within the limits of the zodiac in a few places but not noticeably.

The zodiac was divided, many centuries ago, into twelve signs bearing the same names as the constellations of the zodiac and arranged in the same order. While the constellations were irregular in outline the signs were all exactly thirty degrees long, one for each month. The first sign, Aries, started at the vernal equinox, which is the point of intersection of the ecliptic with the celestial equator, extended a distance of thirty degrees and was followed by the sign of Taurus. The vernal equinox, the zero point, was called, "The First of Aries." At that time the First of Aries was also in the constellation of Aries and the constellation of Aries was in the sign of Aries. The vernal equinox, however, is not fixed in its position with respect to the constellations, though it remains fixed with respect to the signs of the zodiac. It is affected by what is known as precession, which is a slow westward motion of both the autumnal and vernal equinoxes, amounting to about fifty seconds of arc a year. As a result of this precession of the equinoxes the constellations of the zodiac no longer coincide with the signs of the same name. Since the time of Hipparchus, who discovered the precession in 125 A.D., the vernal equinox has shifted westward about thirty degrees from the con-

stellation of Aries into Pisces. So now when the sun is at the vernal equinox it is in the *sign* of Aries and the *constellation* of Pisces, and at the autumnal equinox it is in the sign of Libra and the constellation of Virgo. This westward motion of the equinoxes is steadily increasing at the rate of nearly one and one-half degrees in a century. In a period of about 26,000 years the vernal equinox will have completed the circuit of the zodiac and not until then will the signs and constellations of the zodiac once more agree in position.

The signs of the zodiac, counted from the vernal equinox, are: Aries, The Ram; Taurus, The Bull; Gemini, The Twins; Cancer, The Crab; Leo, The Lion; Virgo, The Virgin; Libra, The Scales; Scorpio, The Scorpion; Sagittarius, The Archer; Capricornus, The Sea-Goat; Aquarius, The Water-Bearer, and Pisces, The Fishes. The symbols used to represent them are, in general, ancient representations of the objects for which they are named. For example, the symbol for Aquarius is the Egyptian character for water.

To find the positions of the signs of the zodiac one starts from the vernal equinox and allots thirty degrees to each sign in the order named above. It will soon be noted that if one marks the positions of the signs of the zodiac on a star-atlas that they do not agree with the positions of the constellations of the same name. The signs of the zodiac are now very little used except by astrologers. They form a convenient method of dividing the ecliptic or annual path of the sun with respect to the seasons. Spring, as we have said, begins when the sun is at the vernal equinox. This is a position that is very important astronomically because it is a zero point from which celestial longitudes are counted along the ecliptic and right ascensions along the celestial equator, which lies directly above the earth's equator. It is customary to say that spring begins when the sun is at the First of Aries, or when it enters the sign of Aries. This is simply a way of saying that the sun is then at the zero point of reference on the celestial sphere, the point of intersection of the ecliptic and the equator. It is actually at that time, as regards its position among the constellations, at a point in the constellation of Pisces which lies in the *sign* of Aries, but west of the *constellation* of Aries. That is, the sign and the constellation of the same name no longer agree in position.

At the beginning of summer the sun enters the sign of Cancer, which begins at a point in the heavens on the ecliptic ninety degrees east in longitude from the vernal equinox. It is then actually in the constellation of Gemini, farthest north of the equator. Three months later the sun is once more on the equator at the autumnal equinox, 180 degrees distant from the vernal equinox. It is then said to enter the sign of Libra, which begins at this point. It is now actually in the constellation of Virgo and its apparent motion among the constellations is southward. That is, it is crossing the equator going south while at the vernal equinox six months earlier it was crossing the equator coming north.

Three months later at the beginning of winter the sun enters the sign of Capricornus, which is equivalent to saying that its longitude counted along the ecliptic from the vernal equinox is now 270 degrees and coincides with the point at which the sign of Capricornus begins. Its actual position at that time is at a point in the constellation of Sagittarius. It has reached its greatest distance south of the equator and will start northward reaching the vernal equinox again and the First Point in the sign of Aries and completing the circuit of the heavens at the beginning of spring. The signs of the zodiac may be said to be useful in designating the point on the ecliptic where the sun is at any time with respect to the seasons. The three spring signs are Aries, Taurus and Gemini; the three summer signs, Cancer, Leo and Virgo; the autumn signs, Libra, Scorpio and Sagittarius, and the winter signs, Capricornus, Aquarius, and Pisces. In general, however, their use is confusing and in astronomy is confined simply to publication of their symbols in the almanacs and the employment of them in giving the position of the sun at the beginning of the seasons.

There seems to be some confusion in the minds of some of our readers, who appear to be acquainted with astrological terms, as to what we mean when we say, for example, that Mars is in Libra early in October. We mean that Mars is then in the constellation of Libra. The position of any celestial object in the zodiac is invariably given by astronomers with respect to the constellation in which it is located and not the sign, with the exception above noted of giving the sign which the sun enters at the beginning of the seasons, and this is a survival of an ancient custom. If one is interested to know what sign an object in a zodiacal constellation is in, such as a planet or the moon, he should mark on a star atlas the positions of the signs of the zodiac, using an atlas which gives the degrees of longitude along the ecliptic. Allow thirty degrees to each sign and, beginning with Aries as the first sign counted from the zero point, or vernal equinox, mark them off in the order given here. One can then see at a glance the correspondence, or rather lack of correspondence, between the signs and constellations of the zodiac. It will be found that the constellations lie directly to the westward of the signs of the same name.

Some of the most interesting groups of stars in the heavens are included among the constellations of the zodiac. They differ greatly from one another in size and brilliancy. Aries, Cancer and Libra are the smallest among them. Of the three, Aries is the most interesting on account of its association with the vernal equinox in ancient times and also because its stars are brighter and its outlines more distinctive than either Cancer or Libra. Cancer contains an interesting cluster of stars known as Praesepe, or The Bee-hive, and also as The Manger. The two faint stars flanking it on either side are called Aselli, The Asses. Libra was at one time a part of the constellation of Scorpio representing the creature's claws, but it became a distinct constellation many centuries ago. Taurus, Gemini and Leo are beautiful constellations of the northern hemisphere. It was in Gemini that the last addition to the sun's family of (Continued on page 192)

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EXIT FRIDAY

THE STORY OF A LITTLE PRAIRIE DOG WHO LIVED IN A MUSEUM AND HAD MANY ADVENTURES

BY MARJORIE SHANAFELT

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FRIDAY

"O, I'm a merry prairie dog,
Yip, yip, yip,
And, like a jolly pollywog,
Flip, flip, flip;
And when I give my little yip,
Why then I flip my little tail
And when I give my tail a flip,
Why then to yip I never fail;
And thus I ever gayly bark,
Yip, yip, yip,
And ever on my daily lark,
Flip, flip, flip."

A ROLY-POLY, brown-pawed, prairie dog came to our museum in the deep pocket of a gray overcoat. From the moment that his bold eyes peeked over the pocket flap we were his slaves. Since the owner of the overcoat called him Friday, why Friday he remained.

Several painful episodes taught Friday to scamper away from the big boots of the students tramping about the laboratories, and we helped by tying a tinkling bell about his pudgy neck. Lickety-larrup down the long room Friday would go. "Tinkle-tinkle," sang the little bell, saying as plain as plain, "Here I am, here I am". Friday was proud of the bell and the ribbon bow at the back of his neck.

FRIDAY BEING A GOOD PRAIRIE DOG FOR A MOMENT

When the boys worked at the long tables, Friday would come out from his napping place and, with a flip of the tail, disappear under the table among the boots. Selecting a pair after some study, he would tug and pull at the shoelaces until they were untied. That was work. Then came play. His brown paws just flew as they unlaced the boots to the very bottom. He would move to the next pair of boots, giving a gay yip as he pounced on the new laces. This tickled these grown-up boys so much that they would pretend not to notice and Friday often got around the class before he was carried off yipping, slapping the hands that had swept him away from his happy work. His feelings being hurt he would retire to a box of sand where he always dug in, refusing to come out. Flattering words or whiffs of something good failed to lure him. He would roll his brown eyes and wriggle his nose, but keep his back towards us until suddenly, thinking we had been punished enough, he would give himself a shake and be off.

One day the boys used their colored inks upon him. A bright green went on his head, gorgeous red on his sleek back, and heavenly blue stripes on his stubby tail. At the laughter all around him Friday danced in glee. He loved nothing better than being the center of a ring of laughing admirers, and would per-

FRIDAY HAD ONE BAD HABIT—HE LOVED CIGARETS

form every antic he could think of until too tired for another step. Then he would hunt for a lap, not a boy's lap, but one made by skirts. Sitting up, he would pull with his paws at the skirt until he was lifted up. He would then settle down in one's arms. Sometimes he would be upside down with his paws in the air. More often he stretched out to the limit, hooking his hind claws into one's belt and going to sleep on his nose.

He was often found sitting on window sills staring out. He seemed full of weighty thoughts. It was weeks before we found out how he reached those windowsills, four feet from the floor. Under each window was a large radiator. Plump Friday would stand up between radiator and wall, bracing his hind feet on the wall and pushing against the radiator with his back. By alternately humping himself as round as he could and then stretching out as far as possible he could scale the wall and finally scramble on the sill.

Many adventures came to Friday. The shining test tubes used by the boys was one of the first. He bit one and found that the shiny thing had hurt him. So he slapped it out of the way and retired to his sandbox to sulk and to wash a bleeding lip.

Large jars stood in the laboratory for scraps of waste material. Stretch as he might Friday could not peer into them, nor could he find any way to climb into them. When Friday wanted anything he stuck to it until he got it. By climbing from one thing to another he at last found himself on a shelf looking right down into one of these inviting jars. So he simply fell into it. Alas poor Friday! The jar had drops of hydrochloric acid in it! By the time he was lifted out his front feet were badly burned. He spent the next few days looking at them and wondering why they hurt so.

Friday was a great friend of Carl, the old janitor, whose big brown eyes were soft and tender. He would run along at Carl's heels. When the heels stopped he would turn into a little statue. If Carl stamped a foot and said "Scat", Friday would bounce up and down in anger, barking lustily. If Carl made a playful swipe at him with the duster from his hip pocket, Friday would catch it with teeth and paws, would tug and pull just as any puppy would play with an old shoe.

FRIDAY GETS A DIRTY NOSE FROM DIGGING IN THE DIRT AND THEN HAS A NIBBLE ON A JUICY ROOT OF GRASS

One of the boys taught him to box. A tap on Friday's nose was the signal. He at once trotted to some chair and took his place between its legs just like a boxer. Out and in went his long-nailed paws. He returned the taps with all the strength he had and those nails often drew blood.

When not otherwise busy Friday searched for paper. Thick or thin, white or colored, printed or plain, it made no difference. He would grab a corner in his mouth and scamper away. Out of the way of the boots he would tear the paper into shreds. These bits he stuffed into a black cotton bag that lay under a low table at one end of the room. This was Friday's sleeping bag. In it was some hay to give Friday sweet dreams of prairie-dog burrows lined with meadow grass. Every scrap of paper that Friday could beg or steal went into this bag.

Friday lived like a prince. His desserts of nuts, macaroons, and cream attracted a Wee Gray Mousekin one day. Along the wall he slipped. With twitching mustachios and trembling nose he peeked out from the edge of a desk at the doll's set of dishes with which Friday's banquet board was set. The only person in the room was quietly grading papers, so Wee Gray Mousekin came forth to taste of the feast. Just then Friday's bold eyes saw him. I think Friday wanted to start up a little friendly chat, but when he bounced out like a rubber ball, Wee Gray Mousekin thought something worse

than a cat was after him and fled. Nor did he ever return although Friday tried to catch up with him and explain matters.

During all these months Friday had lived in the same place. Vacation days came and he went to live in a red bungalow. The lord of that bungalow was a great gray Angora tomcat called Billie Whiskers. Billie Whiskers was just as spoiled as Friday. They were good friends for a time, playing together in a way of their own. One day Friday insisted on cleaning his teeth on Billie Whiskers' tail. Billie Whiskers spit and growled. Friday slapped Billie's face. After that there was armed truce and Friday retired to the bathtub, although they slept together in the same bed at night.

On returning to the laboratories Friday at once got into disgrace. There is nothing in the world as sticky as Canada balsam. So when Friday stuck not only his nose, but his whole head into the Canada balsam jar it was a miracle that we ever got him out again, the stickiest prairie-dog on record. There is just one thing that will wash away Canada balsam and that is a highly refined gasoline. Of course, we didn't dare use enough gasoline to get the balsam all off for fear we would burn his pink skin. The best we could do was to rub him down with a gasoliny rag. For many days Friday wore the hair of his head in sharp-ended wisps of a darker tone than the rest of his shining coat.

Everybody wanted a picture of Friday. Since he would not sit still long enough for an indoors portrait, it was decided to take him out-of-doors. He was taken out by six of us and we were the busiest six anyone can imagine. The moment Friday's paws touched earth he became a prairie-dog.

In one of the laboratories is a door opening into the elevator when it stands on that floor, or into the elevator shaft when the elevator is somewhere else. Friday was always curious about that door. In fact once, when the door had been left open, he had plunged to the bottom. By some miracle he did not die. Well again, little paws in perfect working order, teeth ready for gnawing, he seemed to want another fall. He resumed his game of trying to open that same door. If the door opened to let express or supplies on or off, Friday seemed to sense it no matter where he was and come a-scampering. The door was carefully watched. It had a lock that snapped into place when the door was shut. On a holiday morning we found the elevator door ajar. Someone had not shut the door tight enough. The lock had not snapped. Friday lay quiet at the bottom of the elevator shaft.

Out in the yard under the elm where he often sat gazing, is a tiny grave in which Friday sleeps. Here and there in the laboratories a gnawed screen, a bell whose tinkle has dropped out, some empty doll dishes, still bear testimony of those days when Friday ruled.

• • •

ADVENTURE HILL

Some days the clouds are
full of sheep,
As they chase across the
sky;
Sometimes they're whales
from out the deep,
Then whole menageries go
by.

But now there are no
clouds to fill
The sky that we can see;
So Bobbie climbed Adven-
ture Hill,
To find what there might
be.

And sure enough, away
down low,
Out on the other side;
Quick! They see us now
and so,
They're running very fast
to hide.

PUZZLE: Find Bobbie's pet Lamb, the Raccoon and the Guinea Pig.

GARDENS AND GARDENING

Edited by

ROMAINE B. WARE

If October is not one of the busiest months of your garden year, in all probability you have failed to realize its importance in the scheme of successful gardening. Fall rather than spring should be the main planting season, except where winters are severe. Planting may be carried on over a much longer period in the fall months than during the rush of spring.

Practically all hardy bulbs can go in at no other season, and no garden ever has too many bulbs. I planted 1500 in mine when all my gardening friends vowed there was not room for a hundred. They may be crowded into many places where there is room for nothing else. Snowdrops, scillas, chionodoxas, hyacinths, fritillarias and grape hyacinths may go in at once. Narcissus should be in by now but may still be planted. Tulips may go in any time before the final freeze-up.

Bulbs for the Rock Garden

Do you want something extra choice for your rock garden? Then try a dozen each of those delightful little narcissus—*N. minimus, N. minor* and *N. bulbocodium.* The first is only two inches tall and the other two but six inches. Try *Tulip clausiana,* the candy-stick tulip. Also *T. kaufmanniana, K. greigi, T. eichleri* and *T. sylvestris.* For borders, the novelty parrot tulip "Fantasy" is now becoming more reasonable. It is one of those things your friends will marvel at and ask where you got it.

Desert Candle

Have you ever seen a well grown specimen of the desert candle, botanically named *Eremurus?* It is a bulbous plant throwing up a flower stalk five to eight feet tall with a third of its length closely set with bell-shaped, star-like blossoms in soft tones of rose, yellow, salmon and white. The bulbs are not cheap, because of their scarcity, but very much worth while. Plant them in a sunny position against a background of shrubs. They like rich and moist but well drained soil and their crown just below the surface.

Almost all kinds of lily bulbs may be planted now. Those from abroad which arrive late should be prepared for by applying a heavy mulch where they are to go. This will keep the spot from freezing until they arrive.

Prepare for Roses

In most sections it is too early to plant roses, but the beds should be prepared well in advance. Soil known as clay loam is generally considered best for roses, although they do remarkably well in average good soil. Work it deeply—eighteen inches is not too much—and be sure the spot is well drained. Full sun or partial shade suits roses, but don't forget they have hearty ap-

(Continued on page 189)

May-flowering Tulips
in a full color-range

A famous mixture of named varieties of Dreer's Cottage Garden, Darwin and Breeder Tulips—all of the May-flowering types. The full range of colors found in these classes is here represented, and although the price is very moderate, no finer mixture could possibly be procured. 70 cts. per doz.; $4.75 per 100, postpaid anywhere in U. S. $40. per 1000 at purchaser's expense.

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About Bird Travels

We have recently received a beautiful bird book entitled *Traveling with the Birds.* It is the work of Rudyerd Boulton, assistant curator of birds at the Field Museum of Natural History in Chicago, and it is notably embellished by twelve large colored pictures by Walter Alois Weber. This is a story of bird migration, a simply told story obviously intended for the rising generation of bird lovers. The chapters discuss first the travelers of the air and then the birds' engines, compasses, charts and why they migrate. One chapter is devoted to those birds who have established records of long-distance flying and another to the stay-at-home birds. The author has dedicated this book to his mother, "companion of many a boyhood bird hunt," and it will be of special interest to boys who are not so fortunate as to have mothers who like to go bird hunting or can find the time to do so. The publishers, M. A. Donohue and Company, have done a splendid printing job. The price is low, only $1.50.

Western Nature Books

Under the group title of "Western Nature Science Series" four interesting Nature readers have been made available for Western school use. Their application, in fact, is in the main for the schools of California, but they should find a welcome reception there where the school systems have long had a progressive attitude toward Nature study. In *Trails Today* Walling Corwin gives a fundamental picture of the animals of the West, using a series of imaginary trips into their habitats as a means of introducing his subjects. In *The Indians' Garden* Clarence A. and Ferne L. Marcy collaborate to teach Nature by recreating the conditions of life under which the Indians lived. In *The Padre's Garden* Clarence A. Marcy tells the story of California plants and animals against the unique background of the ancient missions of the Golden State. The fourth volume in the group is *The Pioneers' Pathway* and in it Mae Johnson Corwin uses the early days of California as a canvas upon which to paint a picture of the native flora of the region. As a series these books present material of high value in connection with Nature study courses, and also data susceptible of interrelation with other school work such as history, geography and general science. The price of these books, individually or collectively, is not revealed in the books themselves, but information may be obtained from the publishers, Harr Wagner Publishing Company, San Francisco, California.

New York Parks

While we knew that New York State boasts an outstanding State park system we confess that we did not realize its true extent and diversity until a copy of *New York State Parks,* recently issued by the Conservation Department of the State, came to hand. In an 82-page booklet, illustrated with pictures of some of the parks, the location and facilities of these varied reservations are set forth. New Yorkers are truly fortunate in having these splendid recreational areas. Copies of the booklet are available at the State House in Albany.

NATURE IN PRINT

Kinsey's Biology

In his preface to his *New Introduction to Biology* Dr. Alfred C. Kinsey says that "the success of the program developed in the first edition lends further weight to the conviction that the chief end of our teaching should be the awakening of the student's interest in the living world about him. If we can convince our boys and girls that this *is* an interesting world in which we live, they, of their own initiative, will acquire the specific data on which our science is based, together with a lasting inspiration which may lead them to extend, in later life, their acquaintance with that world. If we fail to interest them, all of the Latin names and morphologic terms, the rules of hygiene, three-to-one ratios and other details will be forgotten after the day of the last recitation and examination." With this conviction Professor Kinsey has so ordered and written his text as to command and stimulate this interest. The new edition takes cognizance of new knowledge brought out by scientific research, and otherwise capitalizes on the experience gained in using the first edition. This is a splendid text. The publishers are J. B. Lippincott Company and the book is listed at $1.68.

Indiana Yearbook

To the cardinal the 1933 yearbook of the Indiana Audubon Society is dedicated in recognition of the elevation of this red songster during the year to the place of State Bird of Indiana. The book, as usual, contains 108 pages of interesting information and observation supplied by members of the Society in all parts of the State. Copies of the book are available at one dollar a copy from Miss Margaret R. Knox, 4030 Park Avenue, Indianapolis, Indiana.

Science Tours

An interesting Science textbook with the title *Tours Through the World of Science* is that written by W. T. Skilling of State Teacher's College, San Diego, California. It is a general science text following a simple and logical program of presentation. The sections are divided into "tours", these progressing from the Earth, the Sea, Air and Water to the Body and Its Care and What the World Is Learning about Food. The publishers are the McGraw-Hill Book Company and the book is listed at $1.70.

Outdoor Advice

A new, 1933 and fourth edition of the little booklet, *List of Hiking and Camping Equipment,* has been brought out by the Potomac Appalachian Trail Club, 609 American Security Building, Washington, D. C. It contains an excellent compilation of information on hiking and camping paraphernalia and is something the hiker and camper should not be without. It costs but fifteen cents and can be ordered from the Club at the address mentioned above.

On Basketry

Perhaps there are other books on this subject but we have never encountered one and were, therefore, much interested in the practical value of *Basket Pioneering* by Osma Palmer Couch. It is a concise and popular handbook designed both for the beginner and the more experienced basket weaver. This volume should, we imagine, find a hearty welcome in camping, school and scout circles. It is profusely illustrated with excellent and understandable drawings of designs and methods of weaving, and the range of items the making of which is suggested is a wide one. The publishers are the Orange Judd Publishing Company and the price is $1.25.

A Fern Exhibit

Botanically-minded visitors at the Century of Progress Exposition in Chicago have found the Horticultural Building of great interest. Among the exhibits there is one of native ferns, including more than one hundred species, many of them rare. There are floating and shoestring ferns from Florida, the climbing fern from Massachusetts, the rare Hart's tongue from New York, and many others. In connection with the exhibit there has been made available a splendid little booklet entitled *Native Ferns.* It contains articles by Dr. Ralph C. Benedict of the Brooklyn Botanic Gardens; Dr. William R. Maxon of the Smithsonian; Dr. Paul C. Standley of the Field Museum, and Dr. Edgar T. Wherry of the University of Pennsylvania. Copies of the booklet may be obtained for fifteen cents a copy from Mrs. Kathryn E. Boydston, 559 Clinton Place, River Forest, Illinois. Mrs. Boydston is in charge of the exhibit and chiefly responsible for it.

Wild Flower Posters

An unusually successful contest for posters telling the story of wild flower preservation was conducted this year by the National Wild Flower Preservation Society. The posters were in several classes depending upon the school grade of the contestants, with one class for adults. One interesting feature of the contest was that the posters were judged without knowledge of their geographical origin and after the judging it was discovered that several came from the same locality. The results spoke highly for the character of the art instruction in the schools of Scranton, Pennsylvania, and Binghamton and Amsterdam, New York. An excellent slogan—"Protect rare wild flowers. See them next year."—also resulted from the contest.

Golden Gardens

This is the fortunate title given to the excellent monthly publication of the California Garden Club Federation, which gives currency to helpful information on gardening in California and gives voice to the sentiments of the numerous member groups. The Federation was active in support of recent legislation in California to restrict roadside ugliness through billboards and otherwise and to foster roadside improvement. Mrs. Leonard B. Slosson, 426 South Arden Boulevard, Los Angeles, is president of the Federation.

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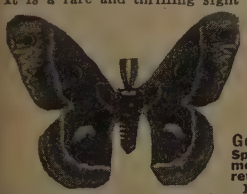

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THE TEN-YEAR INDEX
makes
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(Continued from page 187)

petites. Get your orders off at once and give yourself a rose feast next year.

Deciduous trees may be set out in the fall, with the exception of red and sugar maples, flowering dogwoods, tulip trees, magnolia and sweet-gum. Authorities recommend these be moved in the spring only.

Plant Lilacs Now

Lilacs transplant better now than in the spring. Don't waste space upon the old common lilacs. The new hybrids excel them in every way and bloom at an early age. Little bushes less than three feet in height bear immense spikes more than a foot long. Let me caution you, however, to get them on their own roots. Budded on common lilac or other rootstock, they are seldom satisfactory.

Peony Masses

The planting of peonies may well be continued throughout this month. Hundreds of choice kinds may be bought today at remarkably low prices. Where there is room, plant three or five of a kind in a clump. They make a better display this way. Grouped in front of shrubs or against a background of evergreens, they make gorgeous effects during their blooming season.

Peonies should be spaced three to four feet apart each way. Continuous color may be obtained from the peony bed by interplanting Darwin or breeder tulips for early bloom and tall annuals like zinnias or marigolds to continue the color display. In this way you virtually have a three-storied garden with color early and late.

Japanese iris and perennial phlox transplant better now than in the spring. Both of them relish a liberal dressing of sheep manure. Japanese iris are not planted nearly as much as their beauty and ease of culture warrant. They come into bloom after the great display of tall bearded iris wanes, and their gorgeous blooms make never-to-be-forgotten pictures. Many gardeners pass them up because of a mistaken idea that they must have a wet spot. They thrive in most any good soil provided it is kept loose and well watered.

Add New Plants

Try to add some new things to your garden this fall. If your borders seem crowded, make room by removing some of the material which is only of mediocre quality. No garden is ever so good it can not be improved and there are so many fine new varieties in every plant group. Study them in the catalogs, see them at the nurseries and find places for them in your garden. Read the late Dr. E. H. Wilson's *Aristocrats of the Garden*. He spent a lifetime searching the far corners of the world for new and better plants and writes about them in this and other interesting books.

EDITOR'S NOTE—Where do you buy your plants, seeds and bulbs? Have you found our advertisers offer good values? What kind of horticultural materials would you like to see advertised in our columns? Write us a letter about your garden problems, your hopes and aims. We will be only too glad to hear from you.

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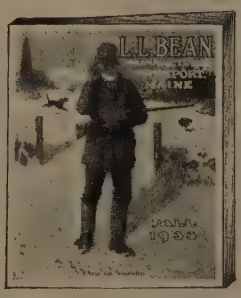

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GARDENING: MID-SUMMER AND FALL

(Continued from page 162)

It is light and porous, readily allowing a free circulation of air.

Another phase of winter care has to do with wind and sun protection for boxwood and other evergreens. Burlap screens, evergreen branches or plantings, straw screens and wooden barriers are used. Unless carefully planned they can readily become a blot upon the winter landscape. Study your problem carefully and you may be able to evolve a scheme that will not be an eyesore.

Avoid the practice of spreading barnyard manure over the lawn either in fall or spring. Not only is it of questionable value so far as plant food goes, but it generally brings in quantities of weed seeds. Top dressing with prepared soil and commercial plant foods is much better.

All successful gardens are the result of carefully worked out plans and fall planting is no exception. Just as soon as a gardener realizes the tremendous possibilities of fall planting there opens a glorious opportunity. The months from July until the ground is frozen can well become the most fruitful of the year.

Tin Night-cap

The strange acquirement of a Central Australian parrot, the Corella, *Kakatoa sanguinolenta,* is described by A. W. Mullen in the Australian Museum Magazine, says *Nature,* London. The individual in question is now twenty-six years old. When it was a year old, the owner's children were firing off crackers close to the bird's cage, when in terror it seized its loose drinking tin (a shallow preserved-meat tin) and placed it over its head—the writer says, "to hide what was to the parrot a terrifying scene." The action in itself was curious, but it is more extraordinary to learn that ever since then the parrot has placed the tin can on its head every night. "He places the tin on his head before falling asleep, and keeps it on like a night-cap until the first streak of dawn awakens him." When by day he had to be transported by rail, he clapped the tin over his head whenever he encountered the strange sights and sounds of the railway station. During his quarter of a century he has worn out at least four tins. We fear to speculate as to the thought which originated and continued this curious action, but remembering the imitativeness of parrots (this one talks and calls the children by name, as well as mimicking dogs and fowls), we wonder if his master ever wore a night-cap.

Brant Reduced

Owing to a dying out of eelgrass generally along the Atlantic Coast from North Carolina to the mouth of the St. Lawrence, a serious diminution in the number of brant returning from Arctic breeding grounds is reported by the United States Bureau of Biological Survey. This condition is regarded seriously since the eelgrass is also an important item in the diet of Canada geese and other waterfowl and is the basis of subsistence for mollusk, crustacean and fish life. It is also an article of commerce. A bacterial disease is chiefly responsible for the shortage.

CAMP SITES—CAMP FIRES—CAMP FOOD

(Continued from page 181)

If, instead, the camper should wish coffee for two meals each day and tea for the third, it would only be necessary to double the allowance of coffee on the food list and eliminate the cocoa. Choosing the specific kinds of cheese, cookies and jam has been left to the taste of the ones taking the trip. It has been assumed (perhaps rashly) that fresh fish could be caught for at least four meals. Four of the noon meals have been planned as "sandwich" lunches, in the event that the trippers wished to climb a mountain, or push ahead all day without stopping to cook lunch. It was also planned that the corn bread mixture and the raisin-nut mayonnaise sandwich filling should be prepared and packed in advance.

In addition to plates, knives, forks, spoons, cups, cereal bowls for each person, an extra cup, plate, and spoon should be carried for serving, and a bread knife, cooking fork, can opener and egg beater for mixing the powdered milk. The menus were planned to be cooked in three nesting kettles, coffee pot, frying pan, and sixteen-inch reflector oven.

Anyone interested in gathering additional information concerning the selection of camp sites, the making of tents, fire building and outdoor cooking will do well to consult *Camping and Woodcraft* by Horace Kephart, published by Macmillan; *The Boys' Book of Camp Life* by Elon Jessup, published by Dutton; or *Kettles and Campfires,* published by the Girl Scouts, Inc.

Scientists Retire

Declaring that their loss "will be distinctly felt in the Biological Survey," Paul G. Redington, chief of that Bureau, has announced the retirement of Vernon Bailey and Dr. T. S. Palmer after 46 and 44 years' service respectively. Both eminent scientists, however, now freed from official duties, will be in a position to continue their contributions to ornithology and mammalogy and to carry forward their work in the interests of conservation.

In the field of natural history, Vernon Bailey's achievements make a notable record. They are described in detail in a biography published in Volume Fourteen of NATURE MAGAZINE, and may now be reread with added interest. Mr. Bailey's studies have taken him to many sections of the United States. He has been active in the work of humane trapping. Mr. Bailey has been Chief Field Naturalist of the Biological Survey since 1890. He is president of the American Society of Mammalogists, a Fellow of the American Association for the Advancement of Science, a member of many scientific groups and of the Scientific Consulting Board of NATURE MAGAZINE.

Dr. Palmer is noted for his activities in game protection and for his work as a zoological historian and biographer. His contributions in making effective the Migratory Bird Treaty Act stand as a monument to his interest in wild life conservation. Dr. Palmer is an officer of or member of a large number of scientific organizations here and abroad.

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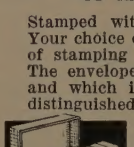

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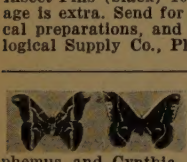

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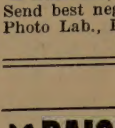

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Deer Increase

During the past year wardens of Algonquin Park, the playground maintained by the Ontario Government in the northeastern section of the province and famous for its fishing, have noticed a definite decrease in the number of wolves within the park boundaries and a consequent increase in the number of deer. Word to this effect has been received by the fish and game department of the Canadian National Railways from F. A. MacDougall, superintendent of the park. In addition to deer, Mr. MacDougall notes that there has been an increase in all the fur bearing animals, particularly beaver, and that moose, which have been scarce in the park for a number of years, are now returning.

LORE OF THE ZODIAC

(Continued from page 183)

planets, Pluto, was discovered three years ago. Virgo is a huge constellation lying on the celestial equator. Its characteristic configuration is a large Y, while that of Leo is The Sickle, and that of Sagittarius the little inverted dipper. Scorpio and Sagittarius, though the farthest south of the zodiacal constellations, are rivals of Taurus, Gemini and Leo in beauty. They are seen at their best in the tropics where they attain a high elevation. In our latitudes they are always low in the southern sky and often dimmed by the haze that is so troublesome at low altitudes. The tail of the Scorpion, that is outlined by so many brilliant stars, is often hidden from our view in northern latitudes by trees or buildings. Capricornus, Aquarius and Pisces are among the least interesting of the zodiacal groups containing no stars of first magnitude and consisting mostly of stars of fourth and fifth magnitude. The Pleiades and Hyades in Taurus are among the finest treasures of the zodiacal belt and have been, probably, the subject of more stories and legends than any other groups of stars in the heavens. Between Libra and Sagittarius there is a small portion of the zodiac occupied by a portion of the large constellation of Ophiuchus through which the moon and the planets often pass. A very small part of Orion, north of Betelgeuze, and a part of Auriga Cetus, Sextans, Hydra, Corvus and Crater just dip into the belt of the zodiac, and stars in some of these regions have been occulted by the moon. The portion of the zodiac that lies farthest north in Gemini has probably been more generally scrutinized than any other portion of the heavens in the search for new planets and this search was eventually rewarded. Neptune, however, was located in the constellation of Aquarius at the time of its discovery. The paths of most of the asteroids as well as the major planets lie close to the plane of the ecliptic. This region is, therefore, a fruitful field for the discovery of new objects in the solar system, except that comets may appear anywhere, even at the north or south poles of the heavens.

No one interested in knowing the constellations should fail to become acquainted at an early date with the zodiacal constellations in their seasons. It is a simple matter to locate them. On winter evenings we see the far northern groups, Taurus, Gemini and Cancer. The far southern ones, Scorpio and Sagittarius, we see only in summer and early fall. Cancer, Leo and Virgo we see in spring and summer. Capricornus, Aquarius, Pisces and Aries are visible in late summer and autumn. The moon will mark out the approximate position of the zodiac in one circuit of the heavens but it is not a good time to study a constellation when the moon is in it because its light dims the light of all but the brightest stars that are near. Wait until the moon has passed on before attempting to identify the constellation through which it passes. With the aid of the sky map one will have little difficulty in locating the zodiacal constellations. The more troublesome ones are those now visible in the evening—Capricornus, Aquarius and Pisces—because they contain no bright stars. Aquarius lies above the bright star Fomalhaut, now visible in the south. Capricornus lies northwest of Fomalhaut and Pisces is to the northeast, north of Cetus, which is also a difficult constellation to locate. One needs the help of the star chart here. Sagittarius is easily located, low in the southwest, and Aries is also visible in the eastern sky at this time. It is south of Andromeda and east of the Great Square in Pegasus.

Saturn is now in Capricornus which will be an aid in identifying the constellation. At sunset on October 15 Saturn will be rather low in the southwest. Mercury will be at greatest elongation east on October 28, so will be visible about that time in the southwest in the evening twilight. It is not in a favorable position for observation because of its far southern location. Venus also is approaching its greatest eastern elongation and is also far south and at a low altitude. On the fifteenth at sunset it will be only about fifteen degrees above the southwestern horizon. On October 14 Mercury and Venus will be in conjunction, with Venus over a degree south of Mercury. Mars is still an evening star setting on the fifteenth about two hours after the sun. It is in Libra the beginning of the month but crosses Scorpio and enters Ophiuchus about October 17. Jupiter is now a morning star and is almost too close to the sun for observation. It is in the constellation of Virgo.

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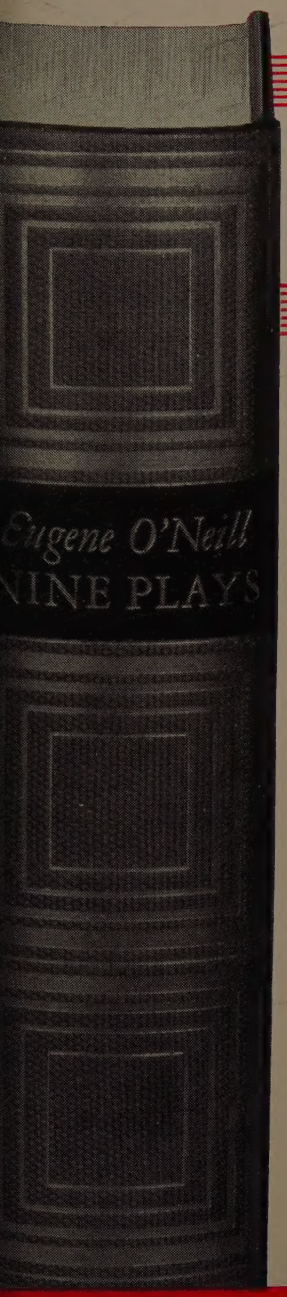

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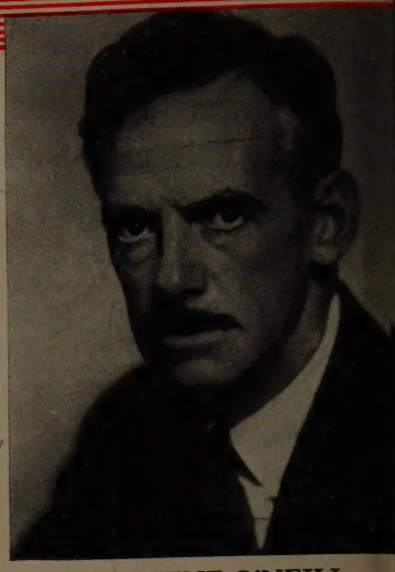

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